The Dock and Harbour Authority

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Editorial

The Port of Beira.

A glance at the map of Africa suffices to show the strategic importance, from a commercial point of view, of the Port of Beira on the South-east coast, as a convenient outlet for the products of the important provinces of North and South Rhodesia. As far back as 1891, the great empire pioneer, Cecil Rhodes, had recognised the necessity of having a sea port for his new settlement in South Africa, nearer than Cape Town. Accordingly, he entered into negotiations with the Portuguese Government, obtaining a concession for the construction of the line of railway, which, branching off from the main system at Salisbury, now runs eastwards through Umtali and terminates at Beira. The value of this connection as regards the overseas trade of the Rhodesias and Nyassaland has proved itself beyond question, for though Beira is a Portuguese port in Portuguese territory, the bulk of the tonnage it receives is in transit to Rhodesia and Nyassaland. The improvements which are about to be made in the accommodation and facilities for shipping, as described in the article in this issue, are due to an increase in trade which is steadily manifesting itself after the unfortunate setback lately experienced in common with most ports during the period of financial depression. The outlook is promising. The effect of the copper quota, in conjunction with the impending exploitation of lead concentrates from Broken Hill and the largely augmented export of chrome ore, gives every prospect of further traffic, and the Port Company are well advised in making preparations for handling it.

As in the case of a previous description of the port, which appeared in the issue of this Journal for April, 1933, we are indebted for the material on which it is based to the courtesy of the Port Company and their Consulting Engineers, Messrs. C. S. Meik and Halcrow, of Westminster.

Scottish Harbours Bill.

The Harbours, Piers and Ferries (Scotland) Bill introduced into Parliament by the Secretary of State for Scotland and the Lord Advocate will, when passed, remedy a state of affairs which has been very unsatisfactory for many years past. It will enable local authorities, that is to say the burgh councils or the county councils, as the case may be, under the authorisation of the Secretary of State to take over from owners who are indisposed, or financially unable, to maintain them in a proper state of serviceability, a number of privately owned jetties and piers which, through long periods of neglect, have been allowed to fall into disrepair, and, in a number of cases, have actually become almost derelict, with considerable danger to those using them. The Bill, of course, does not relate in any way to the leading Scottish ports and docks—Glasgow, Leith, Aberdeen, Dundee, Greenock, Ardrossan and Granton—which are specifically excluded from the scope of the Bill, their wharves and quays being maintained by the constituted authorities in a condition which does not call for the least criticism, but to the isolated piers and landing places to be found scattered here and there, mainly in the Eastern and Western Highlands. Some of these are in a state of neglect which has been described by a competent observer as scandalous. Obviously, only some drastic action, such as is contemplated in the Bill, can ensure that remote fishing hamlets shall, at least, be equipped with serviceable and safe accommodation for the essential and often hazardous occupation of their inhabitants, on which their livelihood depends.

After acquisition, the local authority are to be invested with powers to dredge and improve entrance channels and to provide and construct a wide range of port equipment, including "warehouses, offices, weighing machines, cranes, and other buildings and conveniences," as may be found necessary for the accommodation of vessels and the conduct of the traffic.

In a measure of this character, necessarily involving the expenditure of funds from some source or other, the financial provisions are an important consideration, especially as, in many of the cases, the outlay on repairs, or reconstructions, or improvement works may be considerable, and an appreciable charge on the district rates, out of which any deficiency in the harbour rates is to be made good. Up to the limit of three thousand pounds, operations of a minor character in the counties of Argyll, Inverness, Ross and Cromarty, Sutherland, Caithness, Orkney and Zetland may be undertaken on the authorisation of the Department of Agriculture for Scotland. Apart therefrom, county or town councils are to have power to borrow such sums as may be necessary, for any of the purposes of the Act to which capital is properly applicable, the limiting amount being determined by the Secretary of State. Grants and loans will be available from moneys provided by Parliament.

The general intent of the Bill is in every way admirable, and if its detailed provisions cover all the points involved to the satisfaction of the various parties interested, it will remove a standing grievance, and enable the minor harbours of Scotland to reach a higher standard of efficiency and service.

Oil Discharge in Harbours.

The danger arising from the escape of oil or petroleum spirit into harbour and port waters has again been emphasised by the incident of the fire in Poole Harbour on September 26th last year, which was the subject of proceedings in the police court at Poole in February, when the owners of the tanker, "Pass of Leny," were fined and mulcted in costs for allowing petroleum spirit to escape from the vessel into the harbour during a period of oil discharge ashore. The "Pass of Leny" is a steel steamship of 795 tons gross, 185-ft. long and 30-ft. beam. Arriving in Poole harbour on the morning of September 26th, she had on board a cargo of oil in bulk, 491 tons of petroleum spirit and 208 tons of kerosene. Twenty minutes after commencing to discharge the spirit, fire suddenly appeared on the surface of the water, extending up river from the port bow. The incident, as described by witnesses of the occurrence, showed that a sheet of flames about six yards in length broke out some five yards from the vessel, accompanied by a black pall of smoke, and that they spread round another vessel, the "Pomona," which, as well as several yachts and speed boats moored near to, they set on fire. A chief Inspector under the Petroleum Act gave evidence to the effect that petrol gave off an inflammable vapour at practically any temperature; with kerosene the flash point was 123-4 degrees Fahrenheit. From experiments he had found that petroleum spirit ignited after being on water for 15 minutes, but not after 25 minutes.

The proceedings were instituted by the Harbour Commissioners under the Act of 1922 and not under the harbour bye-laws. The outbreak of a harbour surface fire is fraught with consequences so serious and possibly so disastrous both to human life and shipping, that no loophole should be left for any carelessness or deliberate infraction of preventive regulations. In the present case, the defendants endeavoured to evade responsibility by pleading that all reasonable measures had been taken to prevent the escape of oil. The prosecution maintained, however, that except in the event of collision, this plea was invalid, and in the issue, it proved futile.

Editorial—*continued*

Harbour Accommodation for Flying Ships.

A new, or rather a recently developed, function for port and harbour areas is discussed in the article on Harbour Accommodation for Airships by M. Vorobieff, which is published in this issue. It is evident that port authorities at certain points of strategic importance, either for civil or military purposes, will, in future, have to envisage the possibility of the use by flying craft on an extensive scale of enclosed water areas within their jurisdiction, and that, in certain cases, special accommodation will have to be provided. In this country, owing to the tragic disaster in 1930 to the ill-fated R 101, the construction of airships has received a serious setback, and there are no present indications, so far as we are aware, of a resumption in airship building. But as regards flying craft of other types, striking progress has been made, both in respect of size and speed, so that the provision of suitable bases for large hydroplanes has become essential. Towards the end of last month, indeed, there arose a case in point. A scheme has been approved by the Portsmouth City Council for the complete enclosure of the natural embayment, known as Langstone Harbour, by the formation of a set of three barrages across the lines of sea access, so as to create a sheltered, impounded enclosure to serve as a base for Empire flying craft. The cost will be considerable: it is estimated at £1,221,452, towards which the Government propose to make a grant of £568,226. The scope of the scheme includes dredging operations and the reclamation of sufficient land at Farlington for the erection of an aerodrome, 600 acres in extent. In view of its influence in raising the local rates by a little over 3d. in the pound, the proposal did not pass the Council without strong opposition and the voting was nearly equal—29 votes to 27.

The development of flying craft has been proceeding at such a rapid pace during recent years that the limited accommodation hitherto judged sufficient is now found to be quite inadequate. The construction of giant craft in this country to serve transatlantic and far empire routes will involve an entirely different conception of the harbourage bases on which they will have to depend, and a consideration of the situation by port and coastal authorities will be wise and timely.

South African Port Development.

The news that the Government of the Union of South Africa has decided to embark on a harbour development scheme of outstanding magnitude at Cape Town will hardly have come as a surprise to those of our readers who are conversant with the difficulties which have been experienced in the past on account of the awkwardness and insufficiency of the existing accommodation, and with the criticisms which have been made on the situation, culminating, as is known, in the Government enquiry and report of a couple of years ago. The surprise, if any, is that the programme of extensions and improvement, so urgently needed and so strongly recommended, has been delayed so long. Possibly the extra time taken for consideration of the matter will have permitted a clearer appreciation of the difficulties and led to a better solution of the problem.

It is desirable to reserve detailed particulars of the scheme until they are available from an authoritative technical source and, in due course, we hope to have these to lay before our readers. Meanwhile, it will perhaps suffice to say that the proposal is to expend a sum of 2¼ million pounds during the next four years in providing increased and more convenient shipping accommodation, which will make Cape Town Harbour one of the most commodious artificial enclosures in the world. The possibility of reviving the popularity of the Cape route to the East as a competitive alternative to Suez Canal route has been fully envisaged and in view of the late tension in the Mediterranean, the question was fully discussed in London, by Mr. Pirow, the South African Minister for Defence during his visit to this country last year.

Free Ports.

The idea of the establishment of Free Port areas, or zones, at various ports exercises a certain degree of fascination for a number of people, especially in the United States, where, in certain quarters such areas are advocated as a panacea for local trade depression and a means for producing a considerable increase in port traffic. Needless to say, this view of the scope and possibilities of free port activities is unduly exaggerated. A free port or foreign zone was inaugurated on Staten Island in the Port of New York early in February this year, but although it was hastened into commission under pressure of the Federal Government, there does not seem to have been a very keen response in commercial circles to the opportunity for its exploitation. The fact is that, in general terms, a free port area merely reproduces the special facilities of a bonded warehouse on a rather larger scale, with, perhaps, a less irksome enforcement of Customs formalities. But it cannot, in the nature of things, attract trade to a port on this ground alone, and other conditions must be present to render the establishment of a free port zone a successful commercial undertaking.

The whole matter is competently reviewed and explained by Mr. H. Fugl-Meyer, the Director of the Free Port of Copenhagen, in his report to the authorities of the Port of Boston, U.S.A., which is reproduced by kind permission in this issue. It should serve to remove certain misconceptions and prove a corrective of mistaken ideas.

"Brighter and Better Ports."

The above headline is not ours, and however attractive as a slogan it may be, we cannot claim any merit for it. It has been taken from the London *Morning Post*, which used it in connection with a report on the lecture on Maritime Passenger Stations, published in our last issue. At the time, it struck us as rather fanciful and as going somewhat beyond the scope of the lecture; indeed, it conjured up a picture of wholesale port decorative enlivenment which had scarcely been in mind when we were pleading merely for a higher standard of comfort for passengers at British ports. It seemed to advocate the adoption of vivid colour schemes to relieve the drab monotony of the normal quayside and we were inclined to dismiss the conception with a smile as something inappropriate to the realities of commerce and shipping.

Now, to our surprise, we find that the idea has actually been put into practice at the Port of Stockholm, according to a statement published in the *Nya Dagligt Allehanda*, the leading evening newspaper and chief organ of Stockholm shipping circles. Alluding to Mr. Sol Vinberg, the Director of the Port, who recently celebrated the 60th anniversary of his birthday, the *Nya Dagligt Allehanda* says: "Mr. Vinberg is a man of exceptional ability. He does not hide his light under a bushel and has been the centre of many a hard fight. . . . . When he proposed that cranes should be erected on Skeppsbron Quay some few years back, he was opposed by a number of people who thought that the cranes would spoil the quayside beauty. Mr. Vinberg brushed aside this opposition, however, but made concessions to popular prejudice by giving orders for the cranes to be painted in various colours, blue, green, grey, etc., so as to harmonise more or less with their surroundings. This mollified the critics to some extent, but to complete the compromise all the cranes in the inner neighbourhood have since been painted in different colours."

The kaleidoscopic effect of such a treatment of quayside equipment would seem to be definitely striking, but either the colours were very subdued or we were distracted from observing them by too close observance of other features from the launch, in which, through the courtesy of the authorities, we made a rapid and comprehensive tour of the harbour during a recent visit; at any rate, we failed to notice the startling innovation. The lost opportunity occasions a sense of keen regret. We should have liked to scrutinise the effect of this attempt to brighten up the quayside. We are led to wonder if Mr. Vinberg has any other similar ideas on his mind, and whether these include Venetian masts and streamers—possibly also resplendent uniforms for stevedores and porters.

We cordially concede that in point of natural beauty and scenic surroundings, Stockholm is an exceptional port. To the nature lover, it is a place of infinite charm. Would that some of the multitudinous verdant islets which crowd its approaches could be transferred to the Mouth of the Thames to relieve the bareness and gloom of the estuary flats! In principle, Mr. Vinberg is right; it would be a standing disgrace to make no effort to spare an environment so delightful from the desecration of crude materialism. But, is is possible that a coat of paint on a quay crane suffices to preserve the amenities and reconcile the utilitarian with the æsthetic? We are obliged to leave the subject on this note of interrogation, with the intention of looking into it when we repeat the delightful experience of a visit to Stockholm.

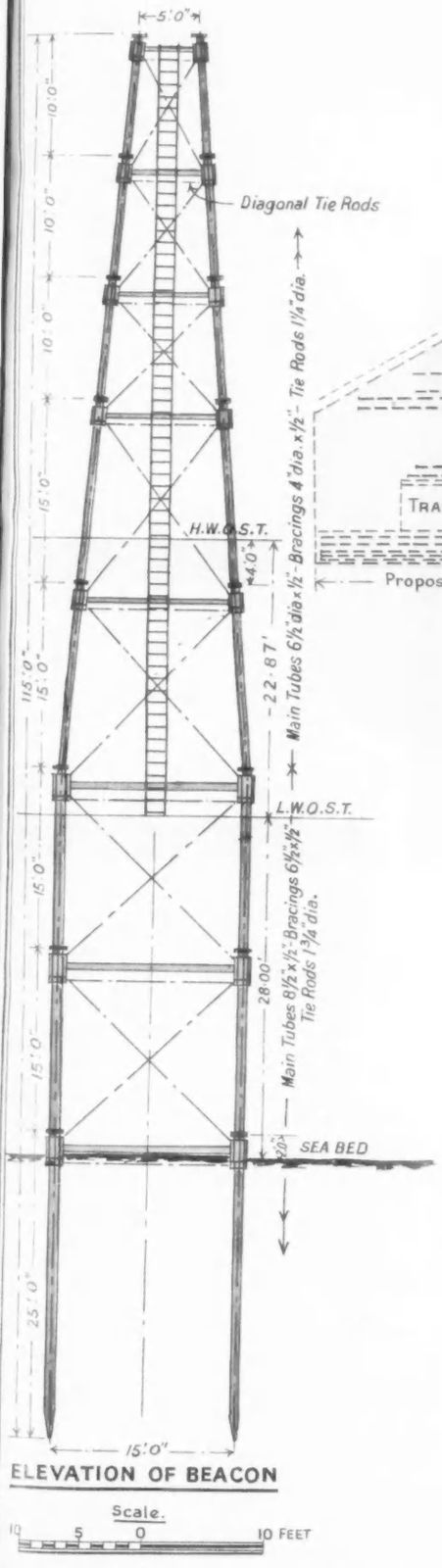
A New Mediterranean Naval Harbour.

The announcement in the daily press that the Italian island of Pantellaria in the Mediterranean and its adjacent waters have been declared a fortified zone, directs attention to a little-known harbour and anchorage located about 60 S.W. of Sicily and 44 miles due east of the Coast of Tunis. The island, with an area of 45 square miles is volcanic in origin and Pantellaria Bay, at the head of which lies the little town and Port of Pantellaria, is not accessible to ships of deep draught, though it could be made accessible by dredging—a development which may be contemplated for naval purposes. Just outside the bay there is ample depth (18 fathoms) over a sandy bottom for the largest ships. As a naval base the island offers several advantages, having a rugged coastline with steep cliffs presenting a natural defence, while its anchorage areas could be fully protected by batteries of modern artillery.

PORT OF BEIRA.

UNDER THE JURISDICTION OF THE MOZAMBIQUE COMPANY.

CONSULTING ENGINEERS;–MESSRS C.S.MEIK & HALCROW, 16, VICTORIA ST S.W.1.



ELEVATION OF BEACON

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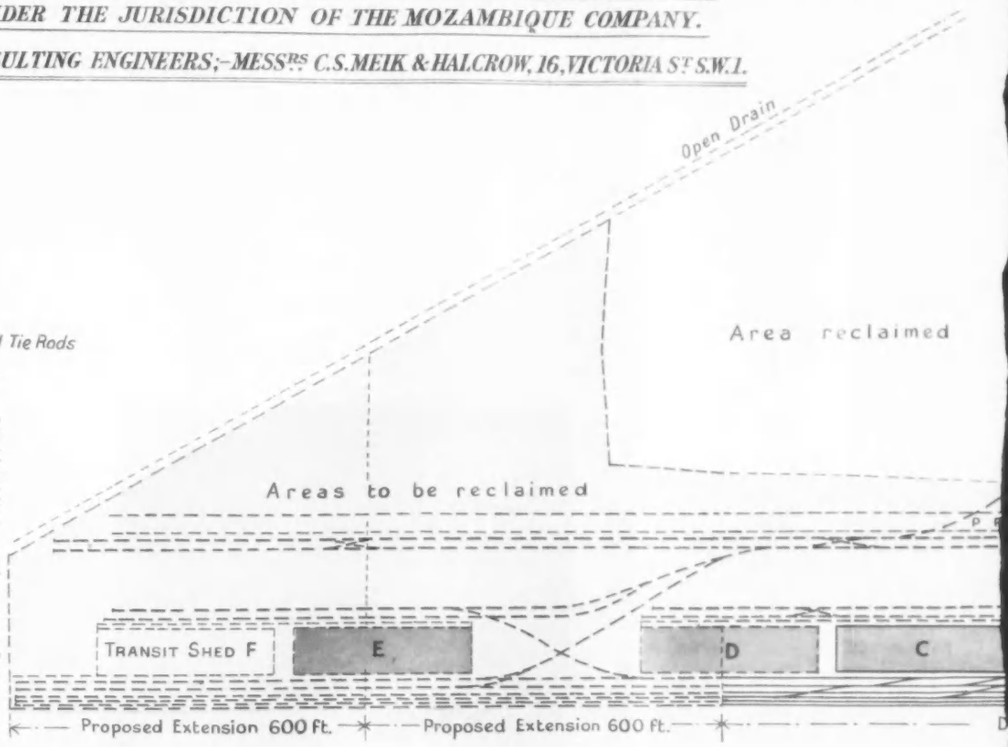

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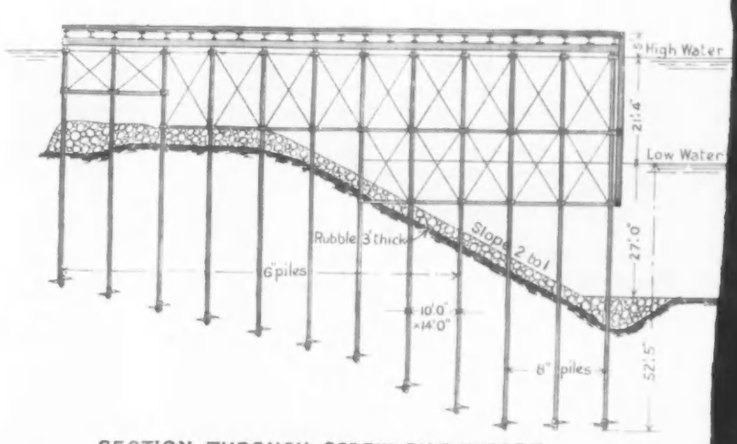

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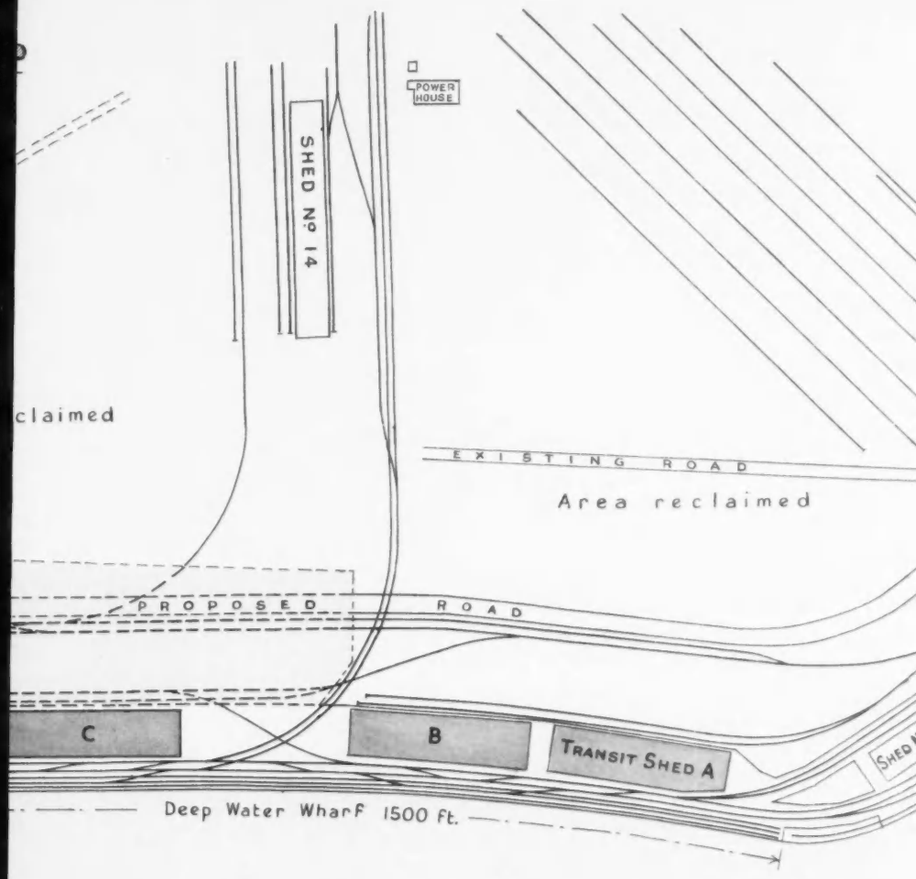
...OCK AND HARBOUR AUTHORITY, APRIL, 1937



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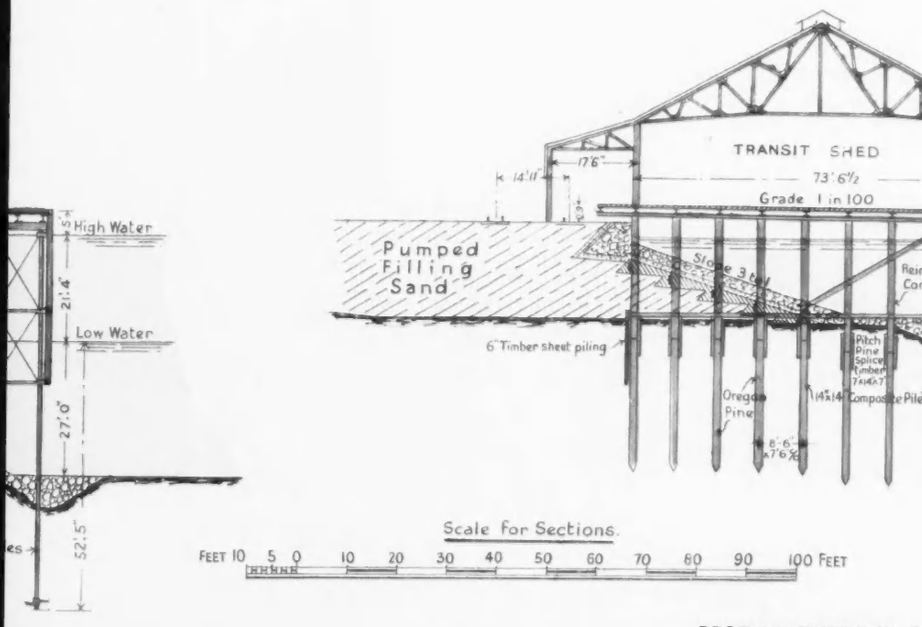

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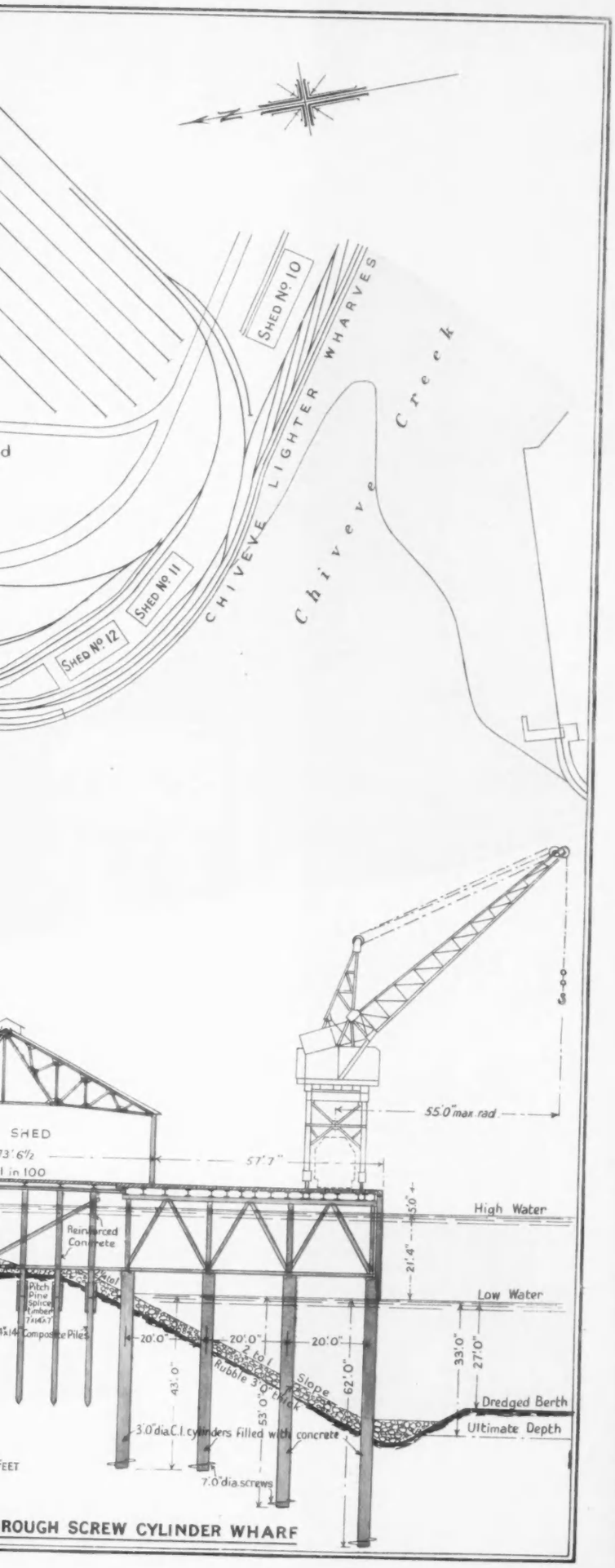


ROUGH SCREW CYLINDER WHARF

The Port of Beira

Recent Progress and Impending Developments

Introductory.

THE commercial operation of the Port of Beira in Portuguese East Africa was originally carried out by the Beira Junction Railway Company at their lighterage wharves, but these proved to be inadequate for the increasing traffic, and in 1925 the Mozambique Company, with the sanction and approval of the Portuguese Government, entered into an agreement with the Port of Beira Development, Ltd., for the building of deep water wharves, the dredging of the harbour, the operation of the port, and the imposition of certain tariffs and charges. In accordance with the terms of this agreement, a Portuguese Limited Liability Company, the Companhia do Porto da Beira, was formed to give effect to this commercial development of the port.

In 1926, by agreements between the Mozambique Company, the Port of Beira Development, Ltd., and the Companhia do Porto da Beira, an English Company—Beira Works, Limited — was formed, which purchased the Port assets of the Beira Junction Railway Company and entered into a contract with the Companhia do Porto da Beira for the construction and operation of these Port facilities.

In the issue of *The Dock and Harbour Authority* for April, 1933, the works were described which had been carried out up to that date for the improvement of the Port. These comprised the extension in steelwork of the lighter wharf by 548-ft., and the construction of 1,500-ft. of deep-water wharf extending up the Pungue River from the lighter wharf, in addition to dredging and reclamations.

These works were completed in 1932, but owing to the decline in traffic following on the severe world-wide financial depression the reclamation of the area immediately behind the deep-water wharf and the erection of the transit sheds had to be deferred until the trade of the Port improved.

As will be seen from the statistics of traffic of the Port there has been a gradual recovery in trade and now the necessity for the provision of additional facilities is becoming increasingly more evident.

Mr. W. T. HALCROW, M.Inst.C.E.
(Messrs. C. S. Meik and Halcrow, Westminster)

Constructional Programme.

The Port Company has, therefore, decided to proceed with the construction of an additional berth 600-ft. in length, being an extension of the existing deep-water wharf, to be followed by another 600-ft. extension when traffic conditions warrant the expenditure, and to complete the reclamation behind the wharf together with the erection of transit sheds.

These wharves will be of a design similar to the wharves completed in 1932, consisting of 3-ft. diameter cast-iron cylinders with screws 7-ft. in diameter, with heavy channel and girder super-structure, the deck being of concrete on pressed steel troughing. The depth alongside the wharf will be 27-ft. at L.W.O.S.T. and this can be increased to 33-ft. if necessary. A cross-section of this wharf is shown on the Illustrated Supplement of this issue.

Reclamation.

In preparation for the erection of transit sheds on the existing deep-water wharf the completion of the reclamation behind the wharf has been carried out departmentally by the Port Company and the area indicated on the Illustrated Supplement has now been completed.

This area was reclaimed by pumping sand obtained from the dredging in the anchorage and a considerable amount of difficulty was experienced owing to the very soft nature of the mud overlying the site, the work having to be carried out by bringing up the stone bund, forming the seaward face of the reclamation, in shallow lifts to retain the sand filling. Towards the end of the work the sand available from dredging in the anchorage was exhausted and the dredger had to be moved down the river to a locality where ample supplies of sand were available.

Entrance Channels.

As stated in the previous article the anchorage at Beira is approached by an entrance channel some 15 miles long from the bar at the mouth of the Estuary. This channel has a minimum depth of 12-ft. at L.W.O.S.T. and at H.W.O.S.T. is navigable by vessels drawing up to 29-ft. The channel is well defined by acetylene light buoys which are maintained by the Port Captain's Department of the Mozambique Company, the Pilot Service being also under the control of this department.

It is a matter of vital importance to the Port that any changes in the depths or location of the channel shall be recorded as soon as they take place and accordingly the channel is regularly surveyed and the results compared with previous surveys. Schemes have been considered for increasing the minimum available depth of water in the channels and improving the approach to the Port through the Estuary of the Pungwe River.

The surveys have to be carried out at distances up to ten miles from land, so that marks on the shore, which is low-lying, were frequently invisible. Beacons were accordingly erected by the Port Company in the positions shown on Fig. 1 on the sand banks in the Estuary, and their positions accurately ascertained by triangulation to serve as reference points for these surveys.

These beacons are tapering towers, three sided, formed of three main 6-in. steel tubes with diagonal tie-rod bracings and tubular struts. The towers are 70-ft. overall, and were sunk 20-ft. into the sand by water-jetting, the lower ends of the tubes being tapered to form nozzles 1-in. in diameter.

The actual operation of sinking these beacons to a depth of 20-ft. occupied less than one minute, the structure sinking easily under its own weight as soon as the pumping of water down the tubes was commenced.

Fairway Beacon.

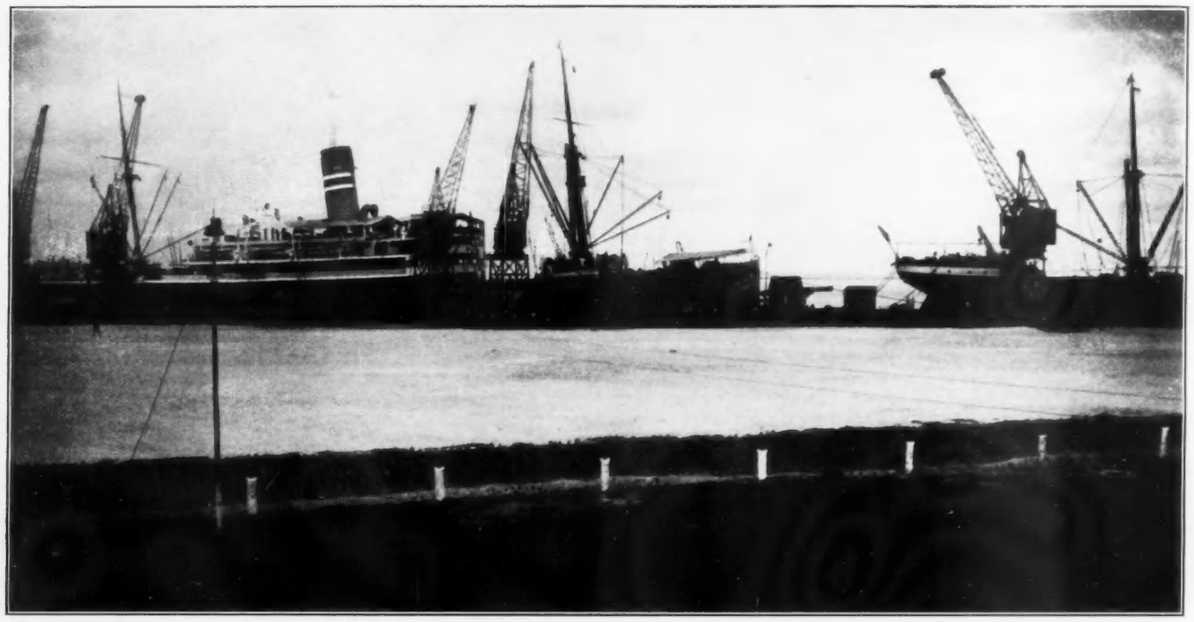
In view of the successful results obtained in the erection of the Survey Beacons, the Port Captain's Department decided to replace the Fairway Buoy, which was moored seawards of the bar and in hazy weather was difficult to pick up by vessels, by a beacon of a type similar to, but of considerably larger dimensions than the Survey Beacons.

This beacon, which is shown on the Illustrated Supplement, stands in 28-ft. of water at L.W.O.S.T. and the base of the light is 40-ft. above H.W.O.S.T., the total height of the structure from the base being 115-ft. It is square in plan with the tubes spaced 15-ft. apart in the lower portion, tapering to 5-ft. apart at the top. The tubes are 8-in. diameter in the lower and 6-in. diameter in the upper portions, the lower ends being tapered to form 1-in. diameter nozzles.

Preparatory to erection on the site the lower sections of the beacon were assembled and supported on steel girders cantilevered out over the side of a coal hulk equipped with steam winches and the necessary lifting tackle. The hulk, with the remainder of the structure on board, was then, as soon as weather and tide conditions were favourable, towed to the site and moored in position.

The structure was raised by the derrick on the hulk sufficiently to enable the supporting girders to be withdrawn, care being taken in slinging to ensure that it was hanging truly vertically. Flexible connections having been made to each tube from a powerful duplex pump on the Port Company's mooring lighter water at 60 lbs. pressure was turned on and the structure was gradually lowered until it reached the re-

The Port of Beira—continued



Land Reclaimed behind Berth No. 1.

quired depth, the whole operation of sinking 25-ft. taking about two minutes.

The erection of the upper part of the beacon was completed by attaching masts and lifting tackle to the lower portion.

Bulk Oil Installations.

Until recently all the petrol and oils used at Beira and in the surrounding territories were imported in cases and drums but, in 1936, negotiations were completed with the Shell Company of Portuguese East Africa, Ltd., for the leasing of a site for an installation for the storage of petrol and fuel oils in bulk and their distribution to stations inland, and this installation is now in operation.

This site is about one mile from the wharf, the pipe lines running from a point near the north end of the deep-water wharf on to the reclaimed area behind the wharf, from which they are carried on an earthen causeway raised a few feet above the level of the swampy ground lying between the reclamation area and the site.

The storage capacity provided in the first instance amounts to 10,000 tons of petrol and 7,500 tons of fuel oil. Negotiations are in progress with other oil companies who also desire sites for bulk oil installations.

The fuel oil pipe lines will be extended along the deep-water wharf to provide bunkering points for vessels.

Dry Docking Facilities.

Beyond two small dry docks in the upper portion of the Chiveve Creek which were provided for the repair and overhaul of the cargo lighters in the Port there are no dry docking facilities in Beira, the nearest dry dock being Lourenzo Marques. All craft belonging to the Port have therefore to be beached at spring tides for cleaning and painting and if heavy repairs have to be undertaken the vessel has to be sent to Lourenzo Marques.

The Port Company have therefore under consideration the provision of a dry dock, to take their dredger, tugs and other craft, on the bank of the Pungue River further upstream than the proposed wharf extensions. Owing to the soft nature of the ground heavy piling will be necessary over the site of this dock. On the other hand, owing to the great range of the tides and the relatively small draft of the craft to be docked, little or no pumping would be necessary in docking vessels.

Present Northern End of Reclaimed Area, showing Port Offices in the foreground.

The Port of Beira—continued

Dredging.

In order to maintain the depth required for vessels of draughts up to 27-ft. to swing safely at the mooring buoys, a regular programme of dredging has to be carried out.

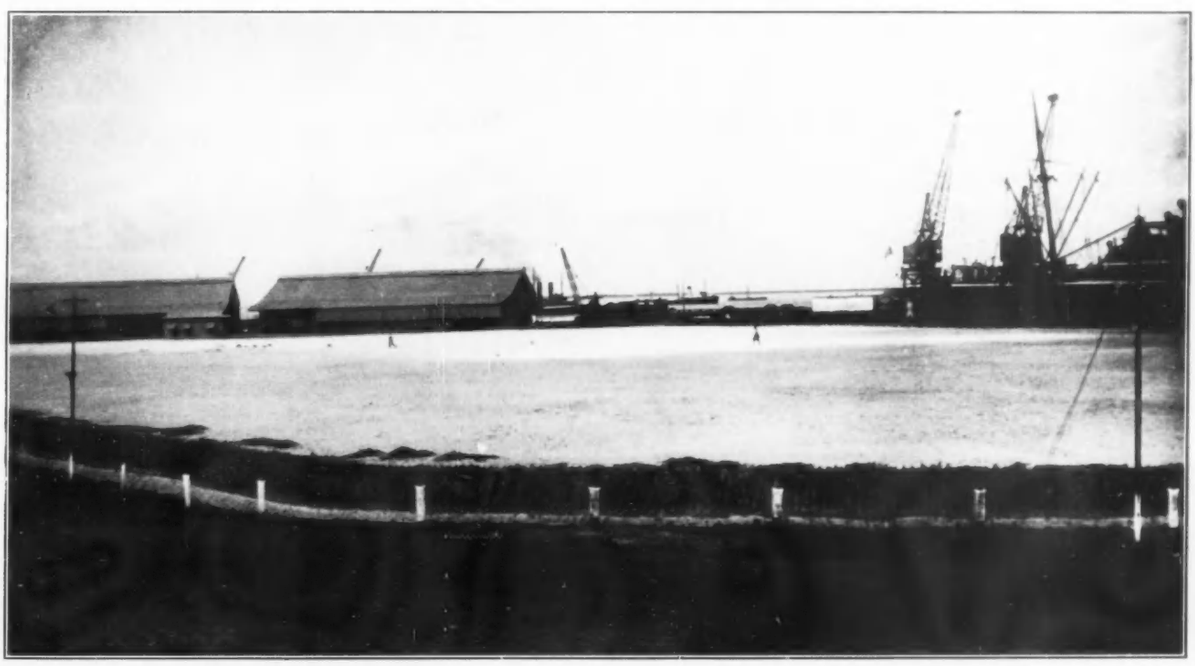
In the early stages the material over the greater part of the area contained a large proportion of sand and was very suitable for reclamation purposes, but as the dredging continued, however, the proportion of sand in the successive deposits of

Northern End of Reclaimed Area.

Maintenance dredging is not necessary over the whole area of the anchorage, being confined to a strip along the foot of a large sand bank along the western side of the anchorage. There appears to be little or no tendency towards the deposition of silt on the eastern side of the anchorage and very little silting is experienced in the berths at the deep-water wharf, any small accumulation being dealt with by a "Priestman" grab.

silt was found to be decreasing and, at present, the only suitable material is to be found at the southern end of the dredging area.

During the progress of the reclamation recently carried out the regular dredging programme had to be slowed down to enable all the suitable material available from dredging to be pumped ashore, and it has now been found necessary to accelerate the work accordingly.



Southern End of Reclaimed Area, showing Sheds behind Lighter Wharves.

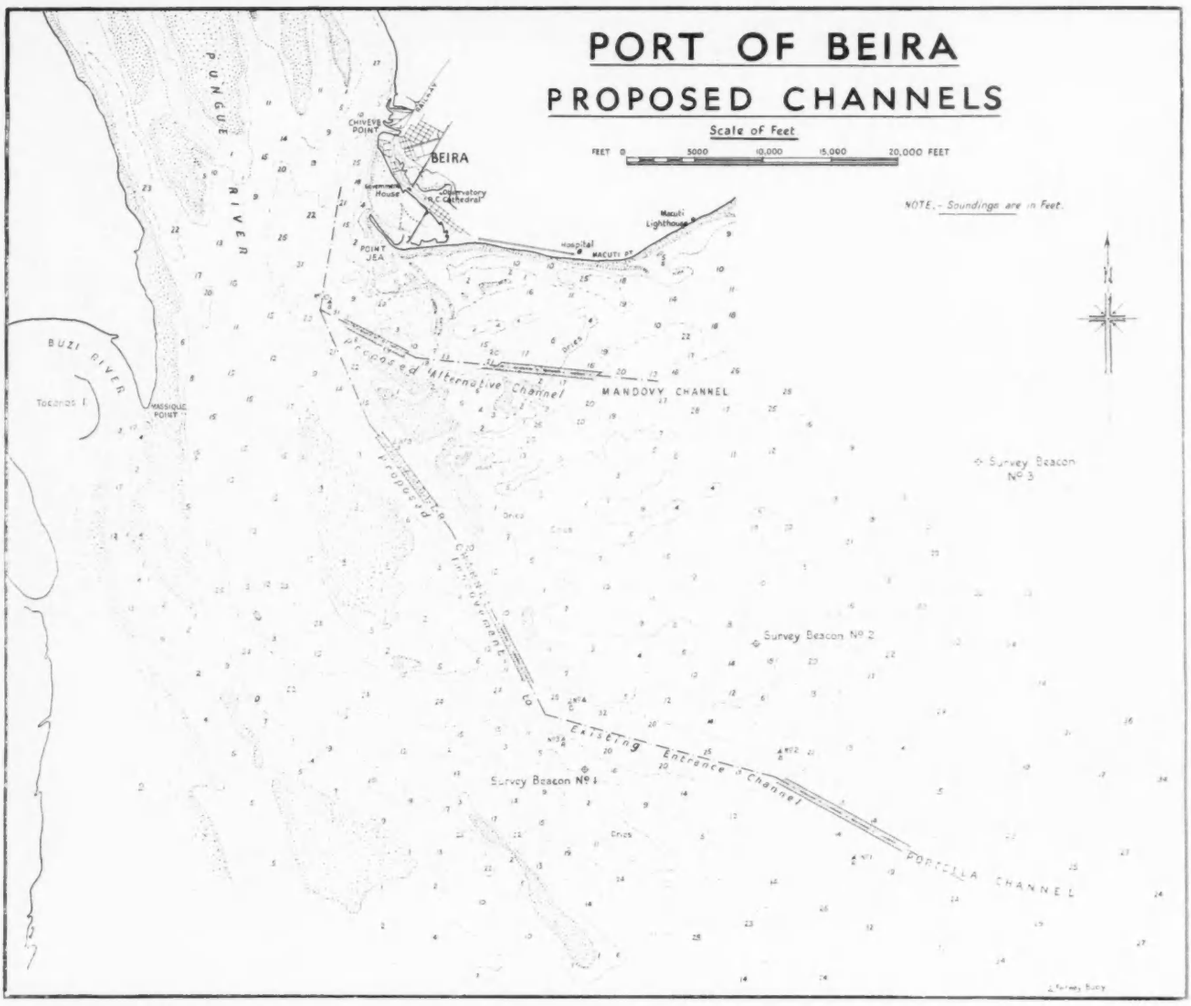
The rate at which silt accumulates in the anchorage is about 450,000 cubic yards per annum, the total quantity dredged to date being 4,814,000 cubic yards which includes the quantity removed in the initial dredging. All dredged material not required for reclamation work is deposited in a deep channel on the western side of the river where its deposit is not detrimental to the Port.

Along the Lighterage Wharf in the Chiveve Creek the deposition of silt is fairly rapid and grab dredging has to be done periodically to maintain the depth necessary for lighters.

Trade of the Port.

We give below particulars of the trade of the Port based on Port Office figures and of the despatch of vessels for the 10

The Port of Beira—continued



The Fairway Beacon is not shown on the Plan—it is about 1,600ft. from the Fairway Buoy.

years 1927 to 1936. These figures show the very serious decline in traffic from 1929 to 1932 and the succeeding recovery and also the remarkable and steady increase in the amount of cargo handled per vessel per day together with the reduction in the duration of the vessels' stay in Port:—

Year	Ocean-going vessels sailed	Tonnage handled including Transhipment, metric tons of 1,000 kilos	Average Tonnage handled per day in Port	Average stay in Port	
				days	hrs.
1927 ...	396	731,442	179	10	8
1928 ..	424	794,514	267	7	0
1929 ...	439	951,012	348	6	5
1930 ...	461	855,624	315	5	22
1931 ...	444	648,530	332	4	10
1932 ...	414	548,205	362	3	16
1333 ...	418	562,061	443	3	1
1934 ...	455	689,006	473	3	5
1935 ...	513	769,169	475	3	4
1936 ...	555	933,694	503	3	8

NOTE.—These figures refer only to ocean-going vessels and their cargoes. Time in Port includes holidays, delays waiting for orders, and any other delays.

The above statistic does not include the coasting traffic which considerably augments the traffic of the Port, as will be seen from the following Port Office figures for 1936:—

INWARDS

No. of ocean-going ships entered	555
No. of coasters entered	154
Total	709
Gross tonnage ... 4,031,033 tons	
	Tons
Cargo landed	235,788
Cargo transhipped	99,158
Total	334,946
Passengers disembarked ... 4,836	

OUTWARDS

No. of ocean-going ships sailed	554
No. of coasters sailed	153
Total	707
Gross tonnage ... 4,031,970 tons	

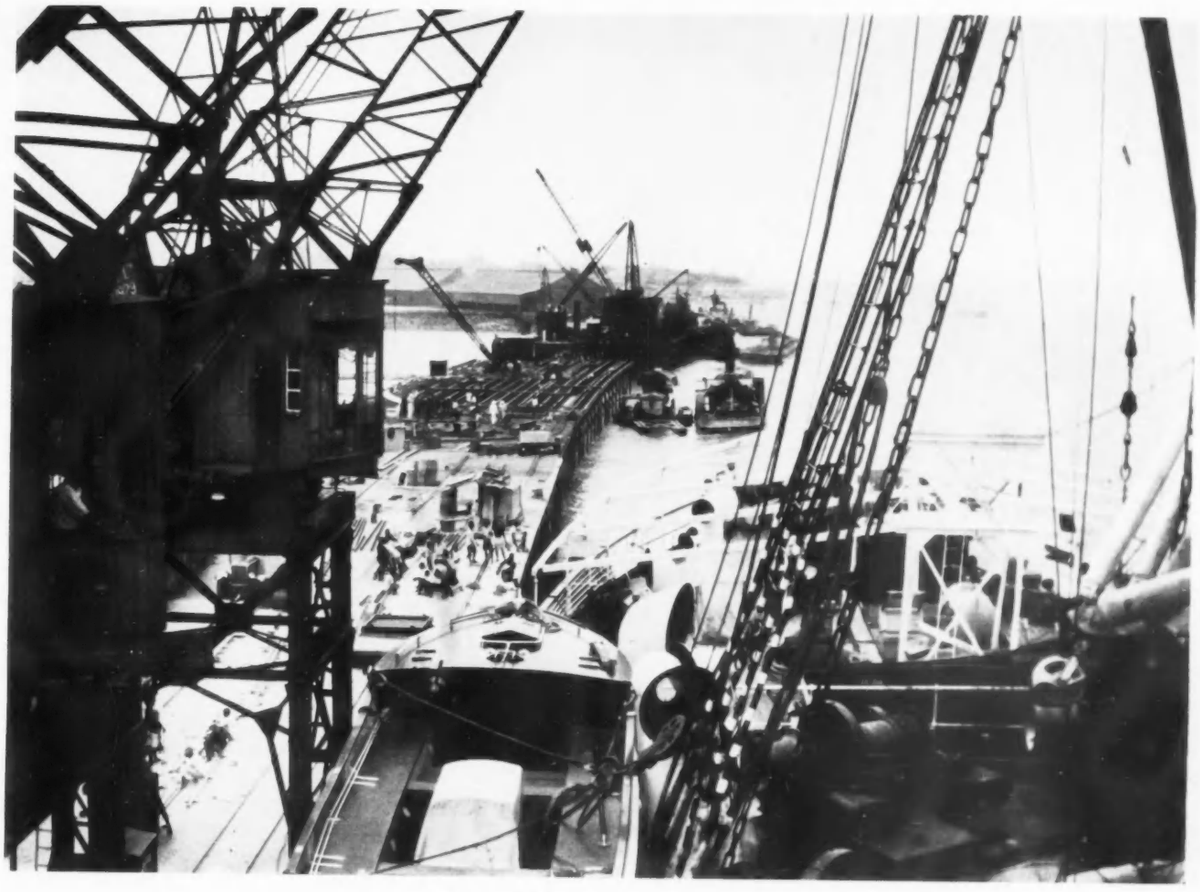
	Tons
Cargo shipped	600,723
Cargo transhipped	98,268
Total	698,991
Passengers embarked ... 4,995	
	Tons
Total direct cargo	836,511
Total transhipped	197,426
Total cargo handled	1,033,937
Total of Passengers ... 9,831	

NOTE—All cargo in metric tons of 1,000 kilos.

Fairway Beacon under Construction.

The marked improvement in the rate of handling cargo in the Port is due almost entirely to the provision of deep-water wharfage and the efficient cranes with which the wharves are equipped. During the year 1936, the total quantity handled

The Port of Beira—continued



View showing work in progress.

over the wharves by Beira Works, Limited, was 995,558 short tons. (In accordance with Port and Railway practice in South Africa these tonnages are quoted in short tons of 2,000 lbs. or 36 cubic feet measurement). Of this quantity 736,442 short tons were handled over the deep-water wharf, representing 74 per cent. of the total handled. This is equivalent to nearly 490 short tons per lineal foot of wharf, a very high figure.

Two additional 6-ton electric cranes were provided in 1935 to increase the capacity of the wharf, but it is doubtful if the capacity can be increased much further, as, during 1936, the berths at the wharf were occupied during 86 per cent. of the time available.

The chief exports during 1936 were as follows:—

	Short tons
Chrome Ore	210,300
Copper	194,100
Maize	119,500
Asbestos	50,100
Tobacco	43,700
Zinc	20,000
Cotton	7,900
Tea	8,500
Citrus	4,300
Native timber and sleepers	7,600
General	21,600
Total	687,600

In order to handle the above quantities more rapidly the Port Company has laid down additional storage sidings and the provision of mechanical appliances for the handling of Chrome Ore is under consideration.

As an example of the rate at which the loading of vessels can now be effected the following may be quoted:—

The ss. "Atna" berthed at 7.45 a.m. on the 18th November, 1935, and sailed at noon on the 20th, having loaded 2,600 long tons of Chrome Ore, 65 crane hours being worked at an average rate per crane of 40 tons per hour.

As regards the future trade of the Port, when the full effect of the new copper quota is felt and the export of lead concentrates from Broken Hill commences, in addition to the general increases in imports to and exports from Southern and Northern Rhodesia, it is anticipated that there will be considerable increases in traffic.

There is also the probability of the construction of a branch line from Tete Coal Mines to join the existing railway from Lake Nyasa to Beira at a point near the recently-completed Lower Zambesi Bridge which would mean the handling of a considerable quantity of constructional material and, later, the carriage of a substantial quantity of coal to Beira.

The Consulting Engineers to the Port Company are Messrs. Melk and Halcrow, of Westminster, all the port works having been carried out to their designs and under their supervision.

Salvage of Floating Oil in Harbours.

It is stated in Lloyd's List that the Texas Company at their Wilmington refinery docks, have just put into service an apparatus for salving oil which finds its way into the dock through spills and leakages. The device consists of a group of 2-in. by 8-in. timbers, each 20-ft. long, and joined together by flexible belting hinges. Doubled together in accordion fashion, these connected timbers will be kept at the top of an inclined platform, the lower end of which enters the water alongside the loading terminals. When a spill occurs, the timbers will be released by a trigger arrangement, and after sliding into the water they will be towed to the oil-polluted area. The lost oil will be recovered by the suction pipe method already in use. United States coastguard officials, who have been conducting a vigorous oil-pollution prevention campaign for the past year, declare that the device will effectively stop a large proportion of harbour pollution.

Mersey Docks and Harbour Board.

It is announced in the Press that the Mersey Docks and Harbour Board have in contemplation a project for improving the facilities for the docking and undocking of vessels engaged in the coastwise trade which use the central systems of docks at Liverpool. Among various schemes considered, that which has been adopted as being most suitable, provides for an entrance with a lock 450-ft. long and 65-ft. wide at the west side of the West Waterloo Dock, which will enable vessels drawing up to 17-ft. of water to enter and leave the dock at practically any state of the tide instead of from within one hour and a half before high water to half an hour after high water as at present.

The Board have authorised the necessary approaches to the Government Departments concerned for certain necessary statutory consents to the carrying out of an operation of the work which lies above high water mark.

Dock and Harbour Authorities' Association

Report of the Executive Committee for the Year ended 31st December, 1936, presented to the Association at the Annual General Meeting on 24th February, 1937

(Slightly Abridged)

Executive Committee.

THE Committee for the seventh successive year elected Lord Ritchie of Dundee, the Chairman of the Port of London Authority, as their Chairman.

Sub-Committees.

Mr C. C. Learmouth (Leith) resigned from the Leith Dock Commission during the year on taking up a new appointment, and Mr. J. D. Easton (Leith) was appointed in his place on the Parliamentary and Railway Matters Sub-Committee. Mr. R. Letch (P.L.A.) was appointed to fill the vacancy on the same Sub-Committee caused by the retirement of Mr. A. G. Dickinson from the service of the Port of London Authority.

Members.

The Association this year comprised 54 Authorities, and the Committee were glad to welcome the Tyne Improvement Commission on their rejoining the Association.

Bideford Corporation joined the Association during the year, but the Committee regret to report that Fowey Harbour Commission have resigned membership as from the end of 1936.

The total net tonnage of British and Foreign vessels arriving and departing with cargoes from and to other countries and coastwise at the principal ports of the United Kingdom, as shown by the Board of Trade Annual Statement of Navigation and Shipping for the year 1935 amounted to approximately 203½ million tons.

The tonnage dealt with at Member Ports extracted from the same Table amounted to approximately 147½ million tons, or over 72 per cent. of the total.

Bills in Parliament.

The undermentioned Bills were considered and amendments sought where necessary to protect the interests of Members.

Air Navigation Act, 1936.

The main purposes of this Government measure are to extend the powers of the Secretary of State for Air under previous legislation to pay subsidies for air transport services; to set up a Board to carry out certain of the functions of the Secretary of State in regard to the design, construction and maintenance of civil aircraft; to enable county and local authorities to acquire lands compulsorily for aerodromes; and to provide for the limitation of liability for third-party damage caused by aircraft and the compulsory insurance of aircraft against third-party risks.

The Bill received the Royal Assent on July 31st.

The main points raised on behalf of the Association with the Merchantile Marine Department of the Board of Trade and the Air Ministry were on Sections 3 and 9.

Section 3 extends the powers of His Majesty in Council to make regulations for the prevention of collisions at sea to the making of regulations to prevent collisions between seaplanes on the surface of the water and vessels, and, *inter alia*, empowers those conservancy or harbour authorities who can at present make bye-laws for the regulation of ships or vessels to make bye-laws for the regulation of seaplanes on the surface of the water.

Representations were made that these provisions should be extended to cover seaplanes not only when on the surface of the water but also when landing or taking off.

The Ministry stated that seaplanes while in the air must be dealt with under the Air Navigation Rules and not under the Collision Regulations, and the matter was fully discussed at a Conference at the Air Ministry attended by representatives of the Association and the Shipowners' Parliamentary Committee on 24th June.

As a result of that Meeting the Ministry have informed the Association that the Minister is taking steps to have the International Convention, 1919, amended so as to provide that an aircraft when in the air and preceeding on its journey, or when preparing to alight upon, or in process of alighting upon or taking off from, the water, shall as far as possible keep clear of all vessels and avoid impeding the navigation thereof.

If and when this amendment is made a corresponding modification will be made in Schedule IV of the Air Navigation (Consolidation) Order, 1923.

Section 9 empowers local authorities, viz., the Common Council of the City of London, the councils of counties and county boroughs, urban district councils, and the councils of metropolitan boroughs, to acquire land compulsorily for aerodrome purposes by a compulsory purchase order confirmed by the Secretary of State for Air.

Part II of the First Schedule, which deals with compulsory purchase orders, was amended in Committee so as to protect the land of statutory undertakers held for the purposes of their undertakings from compulsory acquisition. The expression "statutory undertakers" (*vide* Section 34) means any persons authorised by any enactment or statutory order to construct work or carry on any railway, canal, inland navigation, dock, harbour, tramway, gas, electricity, water, or other public undertaking.

Attention is drawn to Section 14 (Indication of presence of obstructions near aerodromes), which was not in the Bill as introduced.

The relative clause was tabled by the Secretary of State for Air at the Report Stage, and the Bill was recommitted to a Committee of the whole House of Commons on 25th June to consider the new clause. The clause generally speaking would have given an aerodrome proprietor, on the authorisation of the Secretary of State, power to do such work as might be necessary to give aircraft warning of the presence of buildings and erections in the vicinity of an aerodrome, in order to avoid danger to aircraft flying in darkness or conditions of poor visibility, and to enter on land for the purpose.

As a result of representations by the Association the clause was amended so that (1) an order affecting the property of statutory undertakers should be so framed as to avoid interference with the carrying on of the undertaking; (2) three days' notice shall be given to the undertakers before entry is made on their land, and any person entering shall comply with reasonable directions to prevent interference with the carrying on of the undertaking; and (3) any expenses reasonably incurred by the undertakers in taking special measures for securing the safety of any person so entering on their land shall be repaid by the aerodrome proprietors.

Section 28 and the 5th Schedule of the Act amend Section 11 of the Air Navigation Act, 1920, which applies to aircraft the current merchant shipping law relating to wreck and to salvage of life and property.

The amended section, which will come into operation as from such day as may be appointed by Order in Council, provides *inter alia* for the making of Orders applying the law relating to wreck and salvage, with exceptions, adaptions and modifications, to aircraft in on or over the sea or any tidal waters or on or over the shores of the sea or any tidal waters. These provisions are to apply notwithstanding that the aircraft concerned may be foreign. The amended section also provides that the law relating to vessels laid up or neglected as unfit for sea service may be applied by Order to aircraft as if they were vessels.

The Air Ministry have informed the Association that before an Order in Council applying the provisions of any Act relating to wreck or salvage to aircraft is made the Association will be given the opportunity of considering the draft Order.

Petroleum (Transfer of Licences) Act, 1936.

This short Government Act, which received the Royal Assent on 14th July, allows Harbour Authorities to transfer by endorsement or otherwise petroleum spirit licences granted to them under the Petroleum (Consolidation) Act, 1928.

Pilotage Authorities (Limitation of Liability) Act, 1936.

As stated in the September Interim Report the Association's Bill received the Royal Assent on 16th July.

The Bill was not opposed in the First House, but Lord Strabolgi raised objections to the Bill on Second Reading in the House of Lords on behalf of the United Kingdom Pilots' Association. His objections were afterwards withdrawn as a result of a conferenre at the Board of Trade on 10th July.

The Association's thanks are due to, amongst others Sir David Reid for putting the Bill down after drawing 10th place in the ballot for Private Members' Bills, and to Col. Sandeman Allen, who was in charge of the Bill in Committee. Lord Ritchie was responsible for the Bill in all its stages in the House of Lords.

Public Health Act, 1936.

This Govenment Bill, which received the Royal Assent on July 31st, was the second of a series of measures which are being brought forward to consolidate and amend the enactments relating to Local Government and Public Health. The Bill deals with drains, sewers, buildings, water supply, the abatement of nuisances, hospitals, and other matters of this nature.

The Bill was considered by a Joint Committee of both Houses of Parliament.

Dock and Harbour Authorities' Association—continued

The amendments which the Association were able to obtain are set out in Appendix "A" to the September Interim Report (*Circular No. 377*).

Weights and Measures Act, 1936.

This Government Bill, which received the Royal Assent on July 31st, replaced Part I of the 1935 Bill, which had to be dropped owing to lack of time after passing the House of Lords.

When the Bill was introduced in 1935, Clause 1 made it an offence to sell, agree to sell or agree to carry any sand or ballast otherwise than by weight or by the cubic yard with the exception of quantities under one ton in weight and less than one cubic yard in volume.

Ballast is defined as covering, *inter alia*, gravel, shingle, ashes or clinker.

The Bill in its original form might have seriously hampered harbour and conservancy authorities.

As a result of meetings with Board of Trade officials in 1935 satisfactory amendments were obtained, and the Bill of this Session was passed with the principal amendment to Clause 1 then agreed upon, namely, a provision that the clause should not apply in cases where it is a term of the sale or agreement for sale of sand or ballast that the purchaser is to take delivery in or from a vessel as defined by the Merchant Shipping Act, 1894.

The Act contains the other amendments referred to on pages 9 and 10 of the Report for 1935.

Expiring Laws Continuance Act, 1936.

This Act, which received the Royal Assent on the 18th December, extends, *inter alia*, the Harbours, Docks and Piers (Temporary Increase of Charges) Act, 1926, for another year.

The Act also continues until 31st December, 1937, Section 2 and certain other provisions of the Public Works Facilities Act, 1930, subject, in the case of Section 2, to the omission of the words "or statutory undertakers" wherever these words occur. This will have the effect of depriving statutory undertakers of the power which local authorities will continue to have of acquiring land by means of a compulsory purchase order for any of the purposes specified in Part I of the First Schedule to the Act of 1930.

Before deciding not to oppose this provision in the Bill it was ascertained that dock undertakers had made little use of the powers of Section 2 of the Public Works Facilities Act and that other statutory undertakers, in particular the Railway Companies, were not proposing to take any action.

Public Health (Drainage of Trade Premises) Bill.

This Bill, which was introduced into the House of Lords on the 19th May by Lord Gainford on behalf of the Central Council for Rivers Protection, was passed by that House, but was blocked in the House of Commons and made no further progress.

The objects of the Bill were to give legislative effect to the recommendations of the Joint Advisory Committee on River Pollution contained in their second Report presented to the Ministers of Health and Agriculture & Fisheries in April, 1930, viz., that the local sanitary authorities should be placed under a general obligation to take and dispose of the trade effluents of their district and that a trader should have a correlative right to discharge such liquids through the public sewers, and that for this purpose the local authorities should have the same powers and duties for the disposal of these trade effluents as they already have for the disposal of ordinary sewage under the Public Health Acts.

Lord Ritchie stated on Second Reading in the House of Lords that the Association would have to put forward amendments for the protection of navigation interests.

The Ministries of Health and Transport and the Board of Trade were consulted, and after a meeting at the Ministry of Health satisfactory amendments were agreed to with the promotors, and, subject to a further amendment left over for consideration in the Second House, were inserted in the Bill.

The points which the Association raised and which were conceded by the promotors were mainly to ensure that a harbour or conservancy authority should be given notice of the intended discharge of trade affluent through a sewer which has an outfall in tidal waters within their jurisdiction, and also of bye-laws to be made by the local authority affecting the discharge of trade effluents into any such sewer, to enable the harbour or conservancy authority, if necessary, to make representations with a view to making a bye-law to the effect that the trade effluent before entering the sewer should be freed of all matters which might cause or tend to cause injury or obstruction to the navigation on, or the use of, the harbour or tidal waters.

The Bill will probably be re-introduced with amendments consequential on the passing of the Public Health Act, 1936.

Annual Holiday Bill.

This Private Member's Bill obtained Second Reading in the House of Commons on the 27th November and it awaits consideration by a Standing Committee.

It provides that every person who have been in the same employment for 12 months or longer shall be entitled to a holiday of at least 8 clear consecutive days with pay.

Arbitration Bill.

This Private Member's Bill obtained Second Reading in the House of Lords on the 9th December.

Its object is to render void any provision in a written agreement to the effect that all or any specified differences shall be submitted to the arbitration of one of the parties to the agreement or to any officer, servant or agent employed by him.

The point has already been provided for to some extent by the provisions of Section 11 of the Arbitration Act, 1934, and any further proposed change in the law will have to be carefully considered.

Factories Bill.

This Government Bill to amend and consolidate factory legislation is based upon the Factories (No. 2) Bill, 1926, which was introduced in August of that year to enable the various interests affected to consider its provisions and make their representations to the Home Office prior to its intended reintroduction as an effective measure in the Session of 1928. The reintroduction of the Bill has, however, been delayed for various reasons until the present Session.

The Association's Reports for 1926 (pages 11 and 12) and for 1927 (pages 10 and 11) informed members of the conferences held and the representations made to the Home Office in connection with the 1926 Bill.

In the autumn, before the present Bill was drafted, conferences were held at the Home Office by a Committee of the National Confederation of Employers' Organisations, upon which the Association was represented, and the points raised on the 1926 Bill were discussed and reconsidered.

The Bill, which contains 152 clauses and 4 schedules, will receive close attention during all its stages.

Railways Act, 1921.

1936 Review of Standard Charges and Exceptional Charges—As in previous years, the Committee lodged an objection with the Railway Rates Tribunal, with a letter attached addressed to the four amalgamated Railway Companies, calling attention to the unsatisfactory financial position of the Companies' dock and harbour undertakings.

The Review was held on the 18th June and the Tribunal again decided, *vide* their Judgment dated 7th July, to make no modification in the charges.

The Tribunal pointed out that the net revenue of the Railway Companies was less by £18,391,825 than the Standard Revenue, although the figure had improved over the year 1934 by £1,441,038.

Transport Advisory Council.

(a) Membership.—The business of the Council, which was set up by the Road and Rail Traffic Act, 1933, is to advise and assist the Minister of Transport in connection with the discharge by him of his functions in relation to means and facilities for transport and their co-ordination, improvement and development.

Sir Lionel A. P. Warner, C.B.E., General Manager of the Mersey Docks and Harbour Board, is the Member of the Council representing Harbours and Docks (other than those railway-owned or railway-controlled).

The term of office of the present members expires in February, and the Executive Committee have submitted Sir Lionel's name to the Minister for appointment to the new Council.

(b) Co-ordination of Goods Transport.—The Council is at present engaged in considering the desirability of formulating practicable principles upon which co-ordination between all forms of transport carrying goods can be achieved and developed. It has asked the Association, in collaboration with the Railway Companies as large dock owners, to submit constructive suggestions to assist the Council in its Inquiry.

The Association's statement is in course of preparation, and it is hoped to meet the Railway Companies' Managers at an early date so that if possible an agreed document can be submitted to the Council.

Joint Advisory Committee on River Pollution.

The functions of this Joint Committee are to consider and from time to time report on the position with regard to the pollution of rivers and streams and on any legislative, administrative or other measures which appear to them to be desirable for reducing such pollution.

Dock and Harbour Authorities' Association—continued

The Association were asked for their views so as to assist the Joint Committee in an inquiry upon which they are at present engaged, at the request of the Ministers of Health and Agriculture & Fisheries, into the possibility of formulating practicable proposals for the definite association of river pollution prevention work with the Catchment Boards established under the Land Drainage Act, 1930.

The Executive Committee obtained the views of Members of the Association in England and Wales (*vide Circular No.* 381), and in the light of the replies received they wrote to the Joint Committee as follows:—

"1. That the Association would raise no objection to Catchment Boards being given power to enforce the Rivers Pollution Prevention Acts in non-tidal waters where there is no conservancy or other similar authority in existence which already exercises those or similar powers, for example, the Port of London Authority, who already have pollution prevention powers extending to non-tidal waters.

"2. That so far as tidal waters are concerned it is the view of the Association that, where there is a harbour, conservancy or navigation authority for those waters, Catchment Boards should not be entursted with the powers of the Rivers Pollution Preyention Acts, but that the position should be left as it is at present, except that the Association supports the suggestion put forward to the Minister by your Committee for the removal of the restriction to 'sanitary grounds' in the procedure for bringing particular tidal waters within the scope of the Rivers Pollution Preventions Acts.

"In this connection the Association should urge that where there is a harbour, conservancy or navigation authority in existence, such authority should be given a special locus to apply to the Minister to institute a local inquiry with a view to bringing the tidal waters under its jurisdiction, or any part of them, within the scope of the Rivers Pollution Prevention Acts.

"It might also be considered whether the Minister of Transport should not be associated with any such Inquiry.

In a letter it was, however, stressed that individual Members of the Association might wish to take their own line in any locality in which they were interested, and this expression of opinion by the Association, therefore, should not be taken to prejudice in any way such Member. The Association also reserved their right to object either generally or in detail to any proposals put forward as a result of the Joint Committee's Report.

Representatives of the Association had an informal meeting with the Joint Committee at the Ministry of Health on 7th January, 1937, and in reply to questions informed the Committee that, having regard to the answers received from Members of the Association, they were not in a position to assent to any extension of the jurisdiction of Catchment Boards over tidal waters, and they felt that there was a danger of a conflict of interests arising between the conservancy or navigation authority and any special authority that might be set up with anti-pollution powers. They emphasised the point that should such an authority be set up great care would have to be taken to insert in its constitution provisions which would obviate any such conflict and which would protect the interests of conservancy and navigation authorities.

Uniformity of Buoyage and Lighting of Coasts.

The Report for 1935 (p. 17) informed Members that the draft Agreement and Rules for a uniform system of buoyage drawn up by the London Preparatory Committee in 1933 was being submitted to the Council of the League. The Council in May last adopted the Report and decided to open the Agreement for signature by the States invited to the Conference for the Unification of Buoyage and Lighting of Coasts held in Lisbon in 1930 (*vide* Report for 1930, pp. 21 to 24).

Prints of the Report (C128.M.67) and of the draft Agreement and Rules (C128 (*a*) M.67 (*a*) can be obtained from the League of Nations Publications Department, 40, Museum Street, London, W.C.1, price 1s. 3d. and 1s. respectively.

If H.M. Government decide to sign the Agreement it is understood that a conference will be held in order to agree upon an amended national system of uniform buoyage within the framework of the international rules.

International Lighthouse Conference, Berlin, 1937.

The last International Lighthouse Conference was held in Paris in 1933, when Capt. F. W. Mace, O.B.E., R.N.R. (Marine Surveyor, Mersey Docks and Harbour Board), represented the Association. Capt. Mace will attend the Conference in Berlin in July next on behalf of the Association.

Hours of Work of Young Persons in Unregulated Employment

A Home Office Committee appointed to inquire into the hours of employment of young persons (not being subject to the provisions as to hours of employment contained in the Shops Act, 1934, or the Factory and Workshop Act, 1901) invited the Association to give evidence, and Mr. W. H. Venner (Establishment Officer, Port of London Authority) and the Secretary appeared before the Committee with other Employers' representatives on 1st July.

From the evidence submitted by the Association it would appear that should the Committee recommend the Government to initiate legislation on the lines of a 48-hour week for young persons, dock authorities would be little affected.

Bridges and Tunnels crossing Navigable Rivers.

The Association supported the Shipowners' Parliamentary Committee in making representations to the Minister of Transport to the effect that all shipping and navigational interests affected and the Board of Trade should be consulted at the earliest possible stage in the consideration of schemes for bridges or tunnels crossing navigable rivers before any Government grant is promised to any such project.

The Ministry in reply stated that the Minister of Transport shares the view that every effort should be made to reach agreement between all interests concerned with a scheme such as the construction of a bridge or tunnel across tidal waters before the scheme is submitted to Parliament, and being ready to take steps as are in his power to secure that the interests concerned with navigation are consulted at the earliest possible stage, he is in communication with the Board of Trade on this aspect of the matter. The letter, however, contained a warning that if negotiations should prove to be protracted the Minister might have to approve a grant provisionally in order that the decision of Parliament may be obtained.

Oil in Navigable Waters.

The Association's views on the draft Convention on Oil in Navigable Waters prepared by an expert Committee of the League of Nations were communicated to the Board of Trade in February.

The letter took exception to a paragraph in the recommendation accompanying the draft Convention which asks Governments to take measures to increase the number of appliances for separating oil and water on the ground that the appliances provided in this country are more than sufficient for requirements.

International Labour Conference: 40 Hour Week.

The June Conference of the International Labour Office considered for the fifth consecutive occasion proposals for International 40-hour Week Conventions. The proposals covered work in the following industries:—

1. Public Works undertaken or subsidised by Governments.
2. Building and Civil Engineering.
3. Iron and Steel Works.
4. Coal Mines.

In the result the Conference adopted a draft Convention in respect of the first item, Public Works, and in rejecting draft Conventions for the other items passed resolutions requesting the Governing Body to consider the convening of Tripartite Technical Conferences on these subjects.

The draft Convention in respect of Public Works undertaken or subsidised by Governments is in very general terms and allows for the limit of 40 hours to be exceeded in a variety of cases, for instance, in the case of persons employed on preparatory or complementary work, in occupations which involve long periods of inaction, in case of accident, or where urgent work has to be done to machinery or plant. Further, it allows overtime for exceptional cases of pressure of work.

The British Government have adopted a consistent attitude throughout the discussions on the subject of a 40-hour week, and the Minister of Labour (Rt. Hon. Ernest Brown, M.P.), who personally attended the June Conference this year, made a general statement of that attitude. In the course of his speech he emphasised the importance which the British Government attach to the maintenance of the voluntary system of collective bargaining in matters of hours and wages, and, stated that they regarded the Convention of principle adopted in 1935 as unsatisfactory, and were not prepared to take part in applying that Convention of principle to the separate industries which were to come under discussion.

Dock and Harbour Water Transport Premiums.

The Council of the Institute of Transport awarded the Association's Gold Medal to Sir David Owen (General Manager, Port of London Authority, and President for 1936 of the National Confederation of Employers' Organisations) for his paper on "The Future of Port Control with special reference to the possibilities of Grouping." The paper was published in the March number of the Institute's Journal.

No award was made this year in respect of the Association's Silver Medal.

The Medals subject to the same conditions (sent to Members —*Circular No.* 383), are offered for the year 1937, and the Committee hope that Members will take care to bring the competitions to the notice of their officials.

Some Considerations of Problems affecting Port Management

By Sir LIONEL A. P. WARNER, C.B.E., Member

Paper read before the Institute of Transport in London on January 11th, 1937

I FULLY realise that each port has its own peculiar problems and that what is meat for one may be poison to another. Geographical and physical conditions vary greatly and local demands are often entirely different. As a rule it is wise not to prophesy until after the event, but today I will be bold and endeavour to picture some aspects of the problem of the future, which may lead to useful discussion.

My first question is—What demands are likely to be made for increased dock accommodation in this country during the next 25 years, either in the way of (1) new construction or (2) replacement?

New Dock Construction.

The problem of new dock construction is a weighty consideration since the dock engineer must build for posterity and is unable to follow the modern practice, so common in many industries, of building with minimum strength in order to scrap at the appropriate time and replace by something more in keeping with the moment. All our modern docks are built to withstand the hardest use and it the devout wish, I take it, of every management that these works will be serviceable and appropriate for each and every trade for which they are designed, and remain sound for many decades.

Since the end of the Great War, the dock accommodation in the big ports of the country has been increased very greatly, both by remodelling and also by entirely new construction. Under the latter head are:—

London ...	King George V. Dock
Liverpool ...	Gladstone Dock
Southampton	New dock quays of great capacity
Glasgow ...	King George V. Dock and others
Bristol ...	Western and eastern arms of Royal Edward Dock
Newcastle ...	Oil wharves
Port Sunlight	Bromborough Dock
Manchester	Ellesmere Port and Stanow extensions

Sir LIONEL A. P. WARNER, C.B.E., M.Inst.T. (General Manager and Secretary, Mersey Docks and Harbour Board).

(N.B. In addition to these, the King George Dock, Hull, and the dock at Immingham were nearly completed just before the war but did not come effectively into commercial use until after the war).

All this new construction has added many thousands of yards of lineal quay available for ships and cargoes.

On the other hand, so far as I know not much has been done by the smaller ports to increase their docks and it may well be a sign of the times that the advent of motor haulage—practically all in the period which has followed the Great War—and the increased size of many of the coastal vessels have rendered the accommodation of the smaller ports to some extent redundant or of less use. Before the war these ports acted as secondary distributing centres fed from the larger ports—today it looks as if the distribution is largely effected by the larger ports to outlying districts by motor haulage, or it may be by rail haulage under the flat rate system which is of comparatively recent date.

I suppose that no port authority will maintain that all parts of their particular port are thoroughly up to date. This must be the case especially with the older docks which were originally built for sailing ships or smaller coasters, but the large ports have done a great deal both in constructing new docks and in modernising. Each process under this heading generally means increased accommodation and facilities.

If we turn to the other side of the picture we might reasonably expect to find that the trade of the country would show some proportionate increase in step with the dock development. I do not propose in this connection to examine the export trade for this side does not present the same difficulties as the import trade. Exports arrive in our ports definitely fixed and labelled for a particular ship which is going to a particular port. Imports, on the other hand, arrive in large part unsold and with destination unknown. They are more bulky than the exports and as a rule remain longer on quays or dock premises. The Liverpool Steamship Owners Association give a very instructive table in their annual report showing the weight of imports entering our ports in different years.

In their report for 1935 is a comparison of the import weights for the years 1913 and 1934, as follows:

	Tons 1913	Tons 1934
Food, tobacco, wines, etc.	19,000,000	21,000,000
Raw materials ...	29,000,000	27,000,000
Manufactures (other than refined petroleum)	7,000,000	6,000,000
Refined petroleum ...	2,000,000	8,000,000
	57,000,000	62,000,0

These figures are somewhat remarkable for if the refined petroleum, which requires special accommodation, be taken out of the table the imports are practically of the same weight during the years in question. It is true that the Irish Free State foreign imports are included in the 1913 figures and not in those of 1934, but this difference is immaterial since the amount involved is small. It is also true that 1913 was a very good year for trade, whereas 1934 was not. On the other hand the population of the United Kingdom (i.e., Great Britain and Northern Ireland) was 1,040,000 greater than that of the United Kingdom (Great Britain and all Ireland) in 1913, and one would expect some increase in 1934 of foreign imports due to this cause, especially as the three million people in the Free State are also supplied very considerably through the the United Kingdom ports.

The fact remains, however, that with much less port accommodation in 1913 the same weight of goods was handled without difficulty.

An investigation of some of the principal articles imported into the United Kingdom in 1913 and 1934 does not reveal any outstanding feature which has justified the additional dock accommodation which has been provided since the end of the war. (For table see next page).

The weights given therein account for the greater part of the imports which I have already quoted taken from the reports of the Liverpool Steamship Owners' Association for the years in question.

It will be seen that the grain imports have not increased, although the population is greater in 1934.

Meat has increased substantially, also butter, though margarine shows a decrease. Sugar shows little variation. Rubber is up. Manures are down. Timber and wood and cotton are down, all great bulk commodities. Flax, hemp and jute are greatly reduced. Oil seeds are up. Paper making materials and paper have increased greatly. Copper, tin and lead are up. Iron ore shows a great reduction. Fresh fruit is up greatly.

Timber is probably the most bulky of all these imports and is the greatest weight after grain, yet less quay space should have been required for it in 1934 than in 1913. Perishable cargoes such as fruit and butter increased greatly, but of necessity their stay on the quays is short.

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Some Considerations of Problems affecting Port Management—continued

Comparison of imports of certain commodities into the United Kingdom, 1913 and 1934

ARTICLES, Etc.	1913 Tons	1934 Tons
Grain, flour, etc., including offals	11,264,000	11,129,000
Oil seed, cake, meal, etc.	407,000	557,000
Meat	1,161,000	1,508,000
Butter and margarine	283,000	486,000
Cheese	115,000	149,000
Sugar, molasses and glucose	2,205,000	2,305,000
Rubber	76,000	214,000
Asphalt and bitumen	148,000	86,000
Manure and fertilisers	970,000	440,000
Wood and timber	9,902,000	8,571,000
Cotton, including waste	991,000	604,000
Wool	379,000	361,000
Flax and flax tow	102,000	62,000
Hemp and hemp tow	158,000	91,000
Jute (raw)	351,000	195,000
Seeds for expressing oil	798,000	961,000
Gums and resins	119,000	108,000
Hides	73,000	70,000
Paper making materials	1,229,000	2,550,000
Paper, etc.	644,000	1,055,000
Iron, steel and manufactures thereof	2,220,000	1,366,000
Iron ore and scrap	7,565,000	4,707,000
Copper and ore	238,000	292,000
Lead and ore	223,000	316,000
Tin and ore	80,000	49,000
Manganese ore	601,000	202,000
Vegetables	778,000	587,000
Dried fruit and nuts	187,000	255,000
Fruit (fresh)	726,000	1,365,000

Taken all round the cargoes imported in 1934 should not have occupied more space than those in 1913, and probably they did not do so. It may perhaps be argued that labour works shorter hours and so clearance from the docks takes longer, but I think that most will agree that the dock labourer today working eight hours gives an output equal to that when he worked nine hours. Moreover, mechanical appliances of more effective use have increased greatly since 1913, and we have the benefit of motor vehicles to assist in getting the cargoes away. It is probable, however, that more goods are sold *ex* quay and this may tend to delay removal. Taking all these points into consideration the conclusion I come to is that at the present time the port accommodation of the country is in excess of present requirements.

I come now to a consideration which I speak of with some reticence as you may think I am touching a political question. It has been made political by opposing camps in this country, but it is largely an economic question and I speak of it entirely in that light. The present policy of duties on imported goods may be in the best interest of the nation as a whole—of this I am no judge, but I do know that it restricts oversea trade and in connection with my arguments must therefore lessen the flow of traffic through the ports. I believe that history shows that where a nation reverses its policy completely from one system to another in its fiscal arrangements, it is bound to be some years before that decision will be reversed.

The policy of free exchange of goods between this country and others is all to the advantage of shipping and therefore to ports. The encouragement of growing beet at home to produce sugar is a good example of the effect of a policy designed to shut out imports. The Sugar Industry (Re-organisation) Act aims at a home production of sugar of 500,000 tons, assisted by the State to the extent of £2,750,000 per annum. If that quantity of sugar came from our oversea possessions or foreign lands it would probably employ shipping tonnage for more than 100 voyages and the ports which deal with sugar would handle an additional 500,000 tons, to say nothing of the tonnage of the vessels carrying it. The wheat subsidy must also have its effect on the tonnage handled in our ports and there are other oversea commodities handicapped by tariffs and quotas which lessen the demand on our port facilities.

Under a system of nationalism such as we see today, there is bound to be restriction of oversea trade and under such a system less work for our ports to do. Other obstacles to our oversea trade are the too successful attempts made by countries with a low standard of living to replace us in oversea markets by producing goods at a price with which we are unable to compete. The Japanese are a notable example of this with their cheap textile goods. It is true that we may hold our own with the fine textiles but these cannot equal the great bulk of the coarser goods either in volume of raw materials required or in the weight of the finished article, and here again our ships and docks suffer.

It seems almost inevitable that the constantly increasing use of oil in place of coal will still further reduce our imports of mining timber, and presumably at no great distant date we shall reach saturation point in building houses and this must result in smaller imports of timber.

As regards our export trade we must remember that many countries which existed as primary producers and bought their manufactured goods from us are now building up their own industrial systems and turning out finished articles for their home markets. Difficulties connected with climate in the production of textiles especially can now largely be overcome by scientific means and a Lancashire atmosphere produced almost anywhere. In Australia in the years 1923-24 there were 20,000 factories, in 1933-34 these had increased to 23,000. Among these are over 100 wool worsted and shoddy factories. Considering the comparatively small population in the Dominion and the small export trade, other than primary produce, therefrom, it does appear as if their home needs will be met to a growing extent from within the Dominion (especially as the increase of population is at a very low rate). Canada also has a highly developed industrial system. This must be a factor in considering the growth of our export trade.

Our re-export trade is unlikely to assume the same dimensions as pre-war owing to the tendency of foreign nations to import direct from the producing countries, very often by making unproductive voyages under Government subsidy.

Population is another consideration in planning for the future. Imports of foodstuffs especially must bear some ratio to the population of the importing nation. We are told, within a few years the population of these islands will reach its maximum, and after that we shall cease to increase for a short period, followed then by a rapid decrease in our numbers.

Has it ever been thought how great is our consumption of imported foodstuffs per head of population, per annum? The following figures give the weight of some of the imported foodstuffs retained for home consumption per head of the total population of the United Kingdom. It will be noted that grain other than wheat is not included.

Wheat and flour equivalent	605 lbs. per head, per annum: say, 1 ton to 4 people. On this basis a drop in population of 1,000,000 people would mean a drop in imports of these commodities of 250,000 tons per annum.
Butter	
Cheese	
Fruit, dried and fresh	
Meat	
Bacon and hams	
Sugar (including excisable home made)	
Molasses and glucose ditto	
Tea	

The figures which deal with foodstuffs alone show how greatly we depend on overseas supplies and how any substantial reduction in our population must result in a corresponding drop in imports of foodstuffs. It seems reasonable to suppose that in some degree the imports of raw materials and manufactured articles will also be affected.

I do not wish to be a Jeremiah, but it does seem to me that probably we have come to a period when new construction by way of addition to our dock estates will, broadly speaking, be unnecessary for some years to come, owing to the drop in our oversea trade resulting from causes which I have mentioned.

Dock Reconstruction.

Reconstruction of existing docks is an entirely different matter. There must be a lot of dead wood to cut out in most of our dock systems, and it may be more economical to scrap outright certain facilities and build anew for replacement.

The first factor in determining the accommodation required is the ship and her requirements. In a lecture I gave before the Railway Students' Association in 1932, I pointed out the necessity for looking far ahead when constructing docks, and particularly so as regards entrances to closed docks. The authority must always build for something greater than immediate needs. For instance, in Liverpool, when the Langton entrance was constructed in 1879, our largest ship at the date of the dock design was 1,500 tons gross, but the entrance was made to take vessels up to 10,000 tons. Later, in 1901, our largest vessel was 10,000 tons, but the Sandon half-tide entrance was made to take a vessel of 30,000 tons. Similarly with the Gladstone entrance in 1927, the largest vessel using the port was 24,000 tons, but the lock can take the "Queen Mary."

This anticipation of increased size of ship has always been justified in the past, but will it hold good in the future? I venture to think that the size of cargo-carrying vessels has reached its maximum from the simple fact that it is the needs of the merchant, shipper or importer which in the main limit the size of such vessels. We live largely from hand to mouth, and the importer certainly does not want to import more than his requirements for the moment and hold a lot of commodities which incur warehousing charges and which, if held, may lose in value owing to falling markets. There is certainly a tendency these days to sell more *ex* quay and thereby avoid transport costs to warehouses and subsequent charges.

I think it will be found that the cargo carriers built during the last year or two do not exceed a capacity of 10,000 to 12,000 tons; length about 500-ft. (though refrigerated vessels go up to 550-ft.), beam 60 to 70-ft., and depth when loaded 29 to 32-ft. It would seem that the beam may be greater but the depth remaining about the same as at present. They are all built for greater speed.

Some Considerations of Problems affecting Port Management—continued

Of course, there are vessels which require specially large entrances and docks, but they are the exception and are generally built to run between two specified ports and for no other purpose. Their usefulness in sailing between other ports is limited largely by the requirements of the service and in less degree by the approaches to those ports, quite apart from the docks themselves. The great ports of this country are concerned far more in the cargoes carried by ships than by the facilities demanded for passengers. These facilities are costly to provide; they are not remunerative, and appear to be liable to abandonment at short notice. Concentration on cargo facilities is a more certain and remunerative proposition than catering for vessels whose primary duty is to carry people to and fro. It may be that in some instances passenger traffic is the main consideration, but this is only because the cargo business is limited. The progress made in aviation during the last 27 years has been remarkable; what may not happen in the transport of passengers by air during the next 25 years?

I believe that the modern docks of this country do give sufficient opportunity to the shipowner to bring his ship into dock and there to discharge the cargo into shed or lighter with reasonable opportunity of avoiding delay to his sailing. Can dock authorities claim, however, that they provide the cargo owner with facilities which modern-day conditions demand? They generally give the cargo owner a limited period within which he must remove his cargo and so long as it is cleared in reasonable time from the shed or ship the dock authorities often do not take much farther interest in it. Their main anxiety is to clear the dock so as to be ready for the next ship. This procedure was all very well when the transport charges either by land or water carriage was small, but today these charges are all substantial, and what the trader requires is elimination of charges of double handling and transport. Would it not be a sound policy in planning for the future, either by replacement or bringing facilities up to date, to aim at reduction in the costs I have named, and give the trader warehousing facilities at the back of the transit sheds or above them in order to cut out transport charges which could be avoided. Differing trades need differing facilities, but if I had my way in designing a modern dock system I would certainly aim at a system which allowed for cheap and direct warehousing for the trades which require it. All sorts of difficulties are involved, but I believe they are not insurmountable. I finish on my second point with the following conclusion that apparently dock authorities need not expect to have to cater for larger vessels and that future efforts to secure efficiency should be in the direction of endeavouring to assist the merchant in reducing his costs in the handling of his merchandise.

Grouping of Ports.

A considerable amount of attention has been given during the last few years to the question of grouping certain ports which at the present time are run as separate entities. The Royal Commision on Transport in 1929, hinted at such a possibility and Sir David Owen read a paper* on the question before this Institute in February, 1936. I suppose the idea springs from a desire to eliminate competition in its various forms and to effect economies both in capital expenditure and overhead charges and so enable port charges to be reduced. It is a far reaching conception, but so far as I know we have not had even the barest outline as to the method of adoption. It is obvious it might help some ports, and if it led to reduction in port charges the trader would benefit, but it is certain it would be an extremely difficult problem to solve owing to financial considerations, local interests and the varying customs and conditions. If all the major ports were either trust owned or railway owned, grouping would be made easier, and I suppose most of us think that it would be in the general interest of the country if the ports were either all trust owned or all railway owned. The position today is most unsatisfactory to the trust owned ports, which have only their dock revenue with which to meet their obligations to their bond or share holders and are unable to default, in their competition with railway owned ports which in many cases do not pay their way. However, I do not propose here to enlarge on this subject. Taking the varying port administrations as they are today, trust, railway, municipal, company, I do not think that grouping is a practical proposition at the present time. The ground must be prepared before the final goal—grouping—can be attained, that is, if it is desirable. The elimination of competition within a certain area by the substitution of one control in place of several as at present might not be an unmixed blessing to the trader. It is true that amalgamation of railways has been effected and competition between each system largely eliminated, but they have encountered an even keener competition with road transport which has keyed them up to work with even greater efficiency than in the past. An amalgamation of the interests of the major ports within an area would result in little or no competition within that distributing area and this is hardly desirable. It will be noted that I use the expression major ports' interests as distinct from a major port and the small coasting ports in its near vicinity. There are some who think that each major port should be made responsible for the coasting ports which are nearby. In a recent number of a well known shipping paper it was put in this way—"In this country there is no need for a central port administration, but there is need for a port policy. It has been urged that the major ports should be given control of the minor ports in their immediate vicinity and should be encouraged to develop such satellite ports so that the cargoes carried by ocean going ships which they handle shall be cheaply and expeditiously received or distributed by coastal vessels from or to points of origin or consumption."

To my mind even this very limited grouping presents such great difficulties with such problematical benefits that it hardly seems worth while pursuing.

I referred a little earlier to preparing the ground, and quite apart from grouping I think it is most desirable that the ports as they exist today under their varying administrations should come to some agreement on certain matters. One I have in mind is the elimination of competition by undercutting charges on certain consignments. What I mean is—the trust ports publish their schedules of charges and hold to them, everyone is treated alike; many other ports also publish their schedules of charges but often depart from them, solely for the purpose of getting traffic attracted away from another port. Any port can make its schedule high or low within its statutory limits but having determined what those charges shall be, my point is, do not depart from them unless they are increased or lowered all round. Surely this is the fairest way of working, better for the trader in the long run and fairer to those ports which carry out this practice today.

Working Hours in our Ports.

The normal working hours in our ports amount to 44 out of 168 hours in the week. It is true overtime is worked for special cargoes or to maintain scheduled sailings, but generally it is the exception. Sir David Owen, in his paper to which I have already referred, puts the capital expenditure of the ports of the United Kingdom at over £230,000,000. Is there any other industry in the country which has incurred expenditure to any like extent only to use actively its facilities for 8 hours out of the 24? For 16 hours in every 24 much of this capital is lying idle and ineffective except so far as it is incurring interest for those who supplied it with consequent debit against the port authority. Perhaps today this is inevitable, but I am endeavouring to look ahead and what I foresee are shorter working hours all round. The cargo carrying ship, however, is being built for greater speed and therefore the shipowner requires greater despatch in the ports if the ship is to carry out her function of making as many voyages as possible in the year. There seems to be a solution and one we ought to try to make provision for, and I refer to double shifts for the docker. If his present hours of work are reduced, we ought to get a double shift system introduced which will cause capital to be productive for a longer period in every 24 hours and will assist the shipowner in his desire to have as little delay as possible not only on the high seas but also in dock. Two shifts of 6 hours each would add to the capacity of our present facilities and would obviate capital expenditure on further facilities. It may be urged that, if additional hours are worked on the quay sides or on overside work to and from ship, the means of clearing sheds and lighters and all the work entailed in warehouses and by the distributive services will be insufficient to meet the extra demand made on them by working longer hours and congestion will ensue; but is this really likely to happen? We have road transport now which has enabled more deliveries to be made within a given time and this alone should ensure greater facilities for clearing our docks. Warehousing accommodation has been increased during recent years and the railways are far from being overburdened. If shorter hours become general and a shift system be introduced, this condition will also apply to the receiving centres in town and country.

Warehousing Requirements.

Under ordinary conditions it would appear that there is ample warehousing accommodation to meet all peace needs with some surplus over. Cold storage accommodation is probably in excess of requirements and if the attempts to bring into the country more chilled in place of frozen meat are successful, we should definitely have an excess of this form of storage. The general warehousing facilities of this country are for the most part to be found in or around our ports, a very natural condition of affairs since it is obviously an advantage to despatch goods from the ports direct to centres of consumption without

* "The future of port control with special reference to the possibilities of grouping." Institute Journal, March, 1936. (Vol. 17, pp. 273-85).

Some Considerations of Problems affecting Port Management—continued

any intermediate storage for large quantities at inland centres. I have already indicated that the ideal procedure to aim at in the case of goods not going into immediate consumption is discharge from ship to warehouse direct, thereby cuting out intermediate operations, and it is equally desirable to get the goods from dock warehouses to wholesaler or consumer without the necessity of warehousing inland. This is and has been so obvious that warehouse accommodation inland has been reduced to a minimum. This state of affairs is all very well in peace time, but it does not augur well for conditions which may arise in time of war. During the Great War many of us know how government departments hampered the turn round of ships in our ports by the misuse of port facilities, either by commandeering space for purposes unconnected with shipping or by bringing in great gluts of commodities for which no provision for warehousing had been made. The difficulties of our ports in the next war, if there is one, will be increased by the advent of the aeroplane, and the question of holding stocks must arise. In the Great War we maintained our supplies by means of a very large Mercantile Marine and a powerful Navy. Supplies were cut down but we were more or less assured of sufficient imports to carry us through and if our dock facilities are properly used and are available there is no reason to imagine that with sufficient defensive forces and a large Mercantile Marine we cannot do the same again. But it will be noticed that in stating this belief I base it on three conditions:—defensive forces, Mercantile Marine, and availability of the dock facilities. All three are essential, but I am going to assume for the purposes of argument that one or other of the conditions cannot be assured and it seems then that we are driven back to the provision of further warehousing accommodation to ensure supplies which will carry on the nation over bad patches. Where is this warehouse accommodation to be located? Should it be in ports or inland? This of course is a matter of Imperial defence; I am strongly of the opinion that what might be called stores for iron rations for the community at large should be situated well away from the ports where they are less likely to be the object of attack, but it is essential that they should be well served by rail and road.

Inland towns largely rely on a day-by-day service from the ports for their supplies and if this service were upset for a period the results would be serious. If the additional inland storage accommodation which I advocate is provided it must not be allowed to weaken the public demand for keeping the forces and Mercantile Marine up to the proper standard of strength. I cannot judge what the necessary armed strength should be, but I know that our merchant fleet has diminished greatly. Only recently a well-known shipping paper stated that at the beginning of the Great War this country owned 2,813 ocean going liners and cargo vessels of 3,000 tons gross and over, totalling 13.9 million tons gross. Today we own 1,766 such vessels, totalling 11.8 million tons gross, a reduction of over 2 million tons.

Views on the question of additional storage accommodation are bound to be divergent, and I raise the matter with diffidence as it touches questions of Imperial policy.

Legal Notes

Some Aspects of the Poole Harbour Petrol Fire

The case against the owners of the oil-tanker "Pass of Leny," referred to elsewhere in this issue, gives occasion for refreshing the memory as to some of the provisions of the statute under which the proceedings were instituted, namely the Oil in Navigable Waters Act, 1922.

It should be of interest to refer to those sections of the statute which bear upon the case quoted, and it may be possible to draw some conclusions not unhelpful to harbour authorities who are affected by the Act. For the sake of brevity in this article, the report of the prosecution of the "Pass of Leny" at the instance of Poole Harbour Commissioners will be taken as read.

The Oil in Navigable Waters Act, with commendable conciseness, declares its object to be "to make provision against the discharge or escape of oil into navigable waters." Its scope is wide and it applies, roughly speaking, to all waters within the three-mile limit. Oil is defined as including spirit produced from oil, and oil mixed with water. In localities where there is no Harbour Board, the Local Authority is placed, for purposes of the Act, in the position of a Harbour Authority. In practice, however, the Act seems to have become the concern mainly of harbour authorities, adding one more responsibility to those imposed by multifarious statutes, orders, rules and regulations. The Act is expressly stated to be in addition to and not in substitution for all existing Acts, regulations, etc (including bye-laws) for the protection of harbours.

The statute under review is an example of a tendency in modern legislation to restrict rather than enlarge individual freedom. Section 1 of the Act constitutes a new offence and prescribes a penalty for the offender. This offence is committed "if any oil is discharged, or allowed to escape, whether directly or indirectly, into any waters to which this Act applies." The discharge or escape may be from vessels or from any place on land or any oil-transferring apparatus.

The section goes on to provide certain defences which can be pleaded in answer to a prosecution. One of such defences is (in proceedings against the owner or master of a vessel) "that the escape of oil was due to . . . the vessel being in collision . . . and also . . . that all reasonable means were taken by the master to prevent escape."

These words gave learned Counsel at the Poole trial opportunity for legal argument. On behalf of the owners of the ship it was contended, in effect, that the words quoted give two lines of defence, which may be pleaded separately, and that it was sufficient to prove that reasonable preventive measures were taken. For the prosecution it was urged that this was not a good defence as there had been no collision. The owner's plea failed, not on the point of law, but on the magistrates deciding as a fact that the master had not taken reasonable precautions.

The legal point, therefore, still provides a subject for discussion and possibly litigation. Pending a decision of the Courts, the opinion is here submitted that the reading of the Section put forward by Counsel for the Harbour Authority was correct. The words "and also" seem to link with two parts of the paragraph together in a more than accidental manner. If the two sentences were intended to be alternative, surely "or" would have been used, or at least plain "and" without the "also," which seems to import "as well as."

Passing to more practical aspects of the Act as affecting the case in question and Harbour Authorities in general, there are several sections of the Act which give Harbour Masters powers of inspection, control and supervision over vessels, premises and records. These powers are sufficient to enable a Harbour Authority to keep strict and constant watch on operations where petroleum and similar dangerous substances are being handled, and it might be that a full exercise of such powers would go some way towards preventing or checking occurrences such as that at Poole. Busy Harbour Masters may justly point out the limitations imposed on them in this respect by considerations of time, staff and expense. The Act is permissive, not mandatory, but the Poole case emphasises that the escape of inflammable oil constitutes a very real source of danger to property and even to life, and the question arises from the legal point of view whether, on grounds of public policy and safety, some adjustment of routine duties is not called for in order to provide better safeguards against this danger, even if at some inconvenience and expense.

On the point of expense, the "Pass of Leny" case cost the Poole Harbour Commissioners a not inconsiderable sum. This does not encourage Harbour Authorities to bring prosecutions, but it suggests that the expense of additional precautionary measures may be justified. Incidentally Section 5 of the Act enables the Court to direct that fines shall be applied towards the expenses of removing the escaped oil.

Another matter of interest to both lawyer and layman arising out of the Poole case is the evidence adduced at the hearing. Perusal of the report of the proceedings engenders some surprise that a trial lasting two days, engaging an imposing array of Counsel and involving the testimony of twenty-three witnesses, should produce such a small total of definite facts. There was some uncertainty as to the nature of the oil, and it was unfortunate that a sample was not procured. The obtaining of evidence in cases under the Act is therefore an important function of the Harbour Master, and it is suggested that the increased supervision referred to above might help in this respect.

A good deal of the testimony was not material to the main issue but related merely to the consequences. The penalty inflicted appears to indicate that such evidence did not carry much weight with the bench. Evidence that there was an escape of oil was the only requirement to prove an offence under the Act.

In conclusion, the Poole Harbour Commissioners have by their action rendered the double service of warning possible offenders and drawing attention to the desirability of the strict application of an important Act of Parliament.

The French Lighthouse Service

By the Director, A. de ROUVILLE

(Translated from the French)

Historical.

TO trace the beginning of an organised service, one must go back to the period of the First Empire, and consequently attribute its inception to the initiative of Napoleon, which is well known to have been very active in every phase of national administration.

It was, in fact, by an original decree of 7th March, 1806, that the "lighthouses, lanterns, lights, beacons and seamarks" of the French coast were placed under the jurisdiction of the Minister of the Interior, and by a second decree of 29th April, 1811, that the "Lighthouse Commission" was created.

Previously, the Provincial Governors or the Municipalities had provided for some of the needs of navigation and the Admiralty had dealt with the approaches to naval ports.

The new Commission was at first only called upon to advise respecting the best system of distribution of coastal lighting and to eliminate confusion between the small number of different characteristics that were at that time available, depending mainly upon the employment of coloured glasses.

The Commission as initially constituted, comprising Admirals, Inspectors-General of Public Works (Ponts et Chaussées) and members of the Academy of Science, would perhaps not have obtained tangible and important results so speedily as in fact it did, had it not had the good fortune to appoint, in 1819, as Secretary, an engineer of the "Ponts et Chaussées" in Paris, already renowned for his researches in light and illumination and whose reputation as a physicist has become world-wide, Augustin Fresnel.

As was recalled during the celebration, in 1927, of the centenary of his death—a ceremony attended by scientists of all nations, including such British experts as Lord Rayleigh and Messrs. Bragg, Lowry, Richardson, Roberts, Twyman and Wilson—Augustin Fresnel is famous especially for having laid the foundation of the wave theory of light, for having established the principle of refraction by experiments with two mirrors, for having explained the straight-line propagation of light and distinguished the idea of diffusion as accounting for the phenomenon of faint illumination of parts lying within the shadow of any object as cast upon a screen.

In the matter of material inventions, such things are credited to him as, for example, the production of the compound lens composed of independent parallel sections (of which the Service still preserves, in its museum at Paris, the original models made under Fresnel's own direction), and of catadioptric rings based upon the principle of the prism of complete reflection. He achieved notable progress also in the construction of duplex or multi-wick burners, taking advantage of the double-air current suggested, about 1780, by Argand, a Swiss craftsman settled in Montpellier.

The first apparatus embodying Fresnel's ideas was tried on the Arc de Triomphe in Paris, on the 28th August, 1822, and afterwards installed at the lighthouse of Cordouan, in the estuary of the Gironde, on the 20th July, 1823. This constituted a veritable revolution in the development of maritime signalling, since the light was visible for 60 kilometres, or 37 miles, whereas the range of previous reflectors had scarcely exceeded 20 kilometres, or 12 miles. The event speedily attracted the attention of English ship captains and, in 1821, Robert Stevenson, Director of Lighthouses in Scotland, came over to study the new system with a view to adapting it to the needs of his own work.

Administrative Organisation.

The organic entity, which thus owed its formation to the dual impulse of the great Emperor, creator of the administrative machinery of modern France, and of the learned Engineer, who combined keen insight in the domain of physical science with sound practical sense and skill, could not fail to achieve solid success in the functions it was called to serve. In its development up to modern times it has pursued the course of evolution in its successive adaptations and has applied to the growing needs of navigation all the resources of technical science.

To this end the Lighthouse Commission was enlarged in its constitution, in 1929, by the admission of representatives of the Colonial Office, the Admiralty, the Department of Commercial Munitions and the Admiralty services concerned in the training of pilots and in the improvement of harbours.

Following Augustin Fresnel, that is to say during more than a century, half a score of Chief Officers have succeeded one another at the head of the Central Lighthouse Administration. This Service has for 55 years been housed in the Lighthouse Offices, near the Trocadero, built under the architectural direction of Leonce Reynaud, Inspector-General of Public Works, during his period of office.

Alongside the Management itself, there is in Paris a central technical service, fulfilling the functions of research and general planning, of superintending the purchase of special materials and the supply of normal stores, which are standardised for the whole country, such as buoys, cables, lamp oil, etc.

Quayside Buoy Depot at Le Havre.

Executive powers are entrusted to the Chief Engineers of the various maritime districts of the home coasts, who are 21 in number. Their functions comprise, in addition to the charge of the commercial ports, the maintenance and operation of the lighting, marking, and buoying establishments, new works of construction, certain installation of equipment, the management of local business, etc. The whole of the administrative organisation is under the authority of the Minister of Public Works, coming within the scope of his responsibility for the oversight of Maritime Ports and Navigable Waterways.

This method of territorial decentralisation, which is in itself economical, enables the headquarters staff in Paris to be reduced to a minimum, viz.: 9 engineers, 15 assistants and a dozen workmen employed in building small apparatus experimentally or as types, and in testing or receiving apparatus built by outside manufacturers.

Communication is maintained between Headquarters and the coastal outstations chiefly by means of tours of inspection by the Director and other engineers, and by sending fitters from Paris for the installation of any plant requiring special attention.

During the century of its existence, the number of lights in charge of the Lighthouse Service has continually increased, and this development has taken place in a succession of periods of rapid growth.

It may be remarked that a certain proportion of the lights, at present numbering 218, are lighted buoys. For the upkeep of the other lights, in about 620 installations, there is to-day a staff of 580 keepers, 220 of whom (named "auxiliaries") are in charge of the smaller lights, to which they are not required to devote their whole time, so that their pay is appreciably less than that of the regular men. The number of the latter has, moreover, been reduced by abandonment at some points, by changing at others from watched to unwatched lights, and the replacement of regular keepers by part-time auxiliaries.

To these numbers must be added a staff of 55 seamen for the four lightships afloat (including relief crews spending one-third or one-half their time at rest on shore) and 166 officers and men to man the ten buoying and marking vessels (of which five are Diesel-electric driven) and the 25 launches or motor-boats of smaller dimensions.

The Lighthouse Service has now an annual budget of about 10½ million francs, for upkeep and operation, including nearly 7½ million francs for payment of the staff described. In addition there is an appropriation, which has varied in recent years,

The French Lighthouse Service—continued

been 5 and 8 million francs, for new construction. These figures include all charges relating to structures, lights, buoys and other marks, fog signals, etc

Lighthouses and Lights.

The Lighthouse Commission and Service have always aimed at the attainment of the clearest possible definition in coastal lighting, in order to enable navigators to distinguish quickly between the respective roles of principal leading lights, secondary lights, channel marks, port entrance beacons, and so on.

The relative intensity of these must therefore be adjusted accordingly, while taking also into account (since the growth of well-illuminated urban districts on the sea--front) the necessity of intensifying and specialising the harbour lights to distinguish them from the municipal lighting near them.

In this grading of the various lighthouses and lights according to their relative importance, due regard has yet always been paid to the requirement of economy throughout the Service.

"La Vieille" Lighthouse and the "Flat Rock" Tower in the "Sein" Passage.

Another object in view is the gradual transformation, by adopting gas or electricity, of a hundred or so of secondary lights which have hitherto used oil lamps. The graph showing the diminution, since 1890, in the number of such oil-burning lights, illustrates the effect of this movement.

Yet another course of improvement in the lighting of navigation ways consists in the doubling of lights. An old-established lighthouse, for example, placed well back on a solid headland, is supplemented by another light to seaward, in the form of either a beacon tower or a lighted buoy, to mark the submerged projection of a low-lying reef of rock.

Concurrently with these tendencies to numerical increase, the average intensity of lights has increased from 3,200 to 42,300 decimal candles (pentame candles) in the last 40 years. This has been brought about in two ways: by reason of the dimensions of optical apparatus and of the nature of illuminant. In the beginning it was hardly possible to do more than ring the changes on dimensions or kind of apparatus, employing therewith inevitably a lamp, with a greater or smaller number of wicks. In this way a good stock was built up of substantial plant, which has been carefully maintained throughout the century. To give some idea of its extent, the tabular summary given below is taken from the Return of Lights on the Coast of France as at 1st January, 1930:—

Occulting light, hyper radial.	
Focal distance, 1·33m.	1 (Antifer, Seine-Inferieure).
Lights of 1st Order.	
Focal distance, 0·92m.	7 occulting, 5 fixed.
Lights of 2nd Order.	
Focal distance, 0·70m.	20 occulting, 2 fixed.
Lights of 3rd Order.	
Focal distance, 0·50m.	17 occulting or direcctional, 10 fixed

To-day the great variety in kind and variability in brilliance of sources of illumination have profoundly affected the question of producing any required illuminating power, as this no longer depends upon the lens diameter; but it is necessary for the intensity of the light to be taken into account, as well as the focal distance of the lantern, in order that the beam may preserve its correct angle or, in the case of an occulting light, a sufficient period of visibility.

The principal improvements devised affecting *apparatus* have been these:—

In place of heavy lanterns revolving slowly on their bearings, whose movement it was very difficult to keep regular, which led to occulting with long intervals and to an intensity limited by the division of the lanterns into numerous narrow panels; there have been substituted, in the case of occulting lights,lanterns with wide panels rotating in a mercury float, in accordance with an idea that originated with Augustin Fresnel, but was only developed to the point of utilisation by one of his successors, Leon Bourdelles, at the end of last century.

In the particular case of lightships, the amplitude of whose oscillations forbids the use of ordinary lanterns, and for which groups of reflectors of wide angle had long been employed, use has been made of lanterns turning on ball bearings, hung in universal joints and balanced like a compensated pendulum. Thus, in the waters where French lightships are moored, it has become possible to benefit by the fine illumination of a revolving occulting lantern giving a white light of 250,000 candle power, that is to say the equivalent of a land lighthouse of second order.

One may also rank amongst improvements in optical apparatus the utilisation of exhaust gases of combustion to actuate motors for turning small lanterns or occulting screens of the lights on isolated towers, as at Corn-Carhai, Lavezzi; or even lighted buoys, as on the Talais Bank in the Gironde.

As regards the lights themselves, there has been constant progress. The old lamps burning colza oil have been replaced successively first by lamps, of the wick type, burning kerosene or lamp oil, of which there are still some 198 in existence, 73 of them being unattended. Then came petroleum-vapour burners, of which there are now 113 and which are of great value in isolated places, especially in lighthouses at sea, giving by means of an optic of large size, a power of many hundreds of thousands of candles.

From time to time, trial has been made of gas lights, first with naked flame and then with incandescent mantles, now numbering 368, including 218 lighted buoys. The gas first employed was coal-gas, for which storage was difficult; then oil-gas, derived from Shale and other mineral substances; "catalytic" gas, having the advantage over the foregoing, of being capable of great compression (150 kilogrammes per sq. cm., or nearly 1 ton per sq. in.), being in consequence readily portable in steel cylinders, even by small boats, and thus available for the economic supply of isolated stations outside the range of the larger service vessels. In certain special cases, before the introduction of "catalytic" gas, use was made of acetylene gas, either with open flame or incandescent mantle. Quite recently, the idea has been conceived of using "propane" gas, which is commercially available, and which offers much the same advantages as "catalytic" gas.

Finally, there is electricity, one of the most valuable sources of illumination for lighthouses, whether generated on the spot in isolated stations for their own needs, or drawn from a public system of distribution. For about 50 years now electricity has been used in the form of alternating current arc-lights in a small number of the most important lighthouses. During the past 15 years, however, the number of these has been reduced to about 7, by the alteration of certain lights in places where the diminution of intensity due to the substitution of metal-filament lamps was permissible. These latter have represented a considerable advance upon the earlier lamps with carbon filaments, by the brilliance which they show within the limits of a source divergent enough to fill the focal zone of the largest optics. They are employed, to the number of 171, of all powers varying from 6,000 down to 100 watts, alike in the largest lighthouses (even, as already noted, in those which had employed arc-lights) and in the smallest harbour lights.

These newer forms of illuminant have the great advantage of lending themselves readily to the introduction of rhythm or group-flashing in the use of lights with fixed optics, such grouping or rhythm appearing more and more necessary, having regard to developments in navigation and in the public lighting of sea-board urban districts, in order to distinguish between navigation signals, the lights of ships afloat and municipal or private illumination ashore. The adoption of such grouping is moreover one of the recommendations put forward internationally in consequence of investigations undertaken by the League of Nations.

There is no need to describe in detail the manner in which either gas or electric lights can be adapted to rhythmic group-flashing, either by eclipsing screens or cam-operated shutters, driven by a small electric motor or with a pendulum oscillator; there are many possible combinations. It need only

The French Lighthouse Service—continued

be said that it has proved possible to govern rhythmically even oil-burning lights, attended or unattended, without having recourse to revolving screens driven by clockwork requiring periodical re-winding. The heat of the flame is called upon to rotate a fan and thus keep in motion a revolving set of screens. Thanks to efficient lubrication, good results, quite sufficiently regular and dependable, are obtained by this economical method.

Other measures calculated to reduce expenditure on illuminants have taken the form of solar valves for gas lights, and clockwork lighter-extinguishers for both gas and electric lights. A high degree of reliability is needed in such apparatus, in order that any failures occurring or additional visits of inspection occasioned may not outweigh the saving in consumption of illuminating units effected by their regular use.

With a view to safety and to reduce the need of attention, petroleum-vapour lights are fitted with a fusible plug which, in case a fire should occur, accompanied by a leakage of petroleum, releases the compressed air by which the petroleum is lifted. Of a similar character is an arrangement whereby the mantle of an unattended gas light is automatically renewed, by means of a rotating contrivance which puts a fresh mantle in place of one that has failed. The same principle, with a rotating tray, is applied to the replacement of electric lamps or the substitution of an emergency gas light for an electric lamp, in case of failure of current or breakage of a bulb. Appliances have also been devised to operate automatically the admission of petrol and to release a petrol-electric stand-by, in case of the failure of current in a sector feeding an important light.

The average intensity of lights, having increased 13 times more rapidly than their number since 1895 (apart from landfall lights, whose situation is not comparable), while the growth in number of gas and electric lights has substantially made up for the reduction in number of oil lights; such increase in average intensity can be regarded as corresponding to an increase of 40 per cent. in the mean range of the whole.

This range, or distance of visibility of lights, as set down in tabular lists, is based less upon theoretical calculations than upon observations repeated throughout many years in regard to a certain number of typical lighthouses that are visible from many other points. Within the data of actual ranges thus experimentally determined, the ranges of other lights are interpolated, taking into account any relevant local conditions.

As regards the erection of land structures, the Lighthouse Service has hardly any more large lighthouses to build. It has always sought to embody a good architectural style in establishments exposed to public view. This task has been rendered easier by the occurrence of suitable materials, such as granite and hard limestone, in the very localities where lighthouses are needed. The course has also been encouraged by the consideration that care taken in design and workmanship, in both masonry construction and internal finish, is never thrown away, because of the durability of such work and the consequent reduction in cost of maintenance. In this connection, the Service is now directing all its efforts to ensuring weather-tightness of roofs, walls and surfacing, both in lighthouse towers and living quarters, by utilising the qualities of certain materials of recent introduction. Such action offers double benefit in the preservation of property and the comfort of staff.

Means of access to lighthouses at sea have been improved by the adoption of various communication systems and cableways.

To be concluded by descriptions of navigation marking, fog signalling, general equipment and external relations.

Maritime Passenger Stations

Comments on Lecture published in March issue

Mr. P. de Malglaive.—As a user of nearly all maritime passenger stations, I fully endorse the remarks made by Dr. Cunningham. On the whole, all the British maritime stations have been arranged mainly for the handling of cargo and one has the impression that the passenger traffic has more or less been overlooked and is considered as an auxiliary function.

Even in the most modern station and in harbours where the volume of traffic is well above the half-million mark, no real effort has been made to provide adequate facilities for passengers. Waiting rooms are too small or inadequate, sitting-room accommodation practically non-existent, postal and telephone facilities absent, and even the handling of luggage is done in a haphazard way, without mentioning the Customs examination shed.

Another point concerns sidings for trains. Except at Dover, where the passenger accommodation is fair—if one omits the Customs examination shed—only one train at a time can wait at the platform, so when the number of passengers to be handled is above the capacity of that one train, the passengers for the other have to wait, or else they all crowd into the first, causing confusion and dissatisfaction. The problem has been solved in many Continental stations where two or three or even more trains can be kept ready at the same time, so that passengers, so soon as their luggage has been examined, can go to their compartments and wait until the time of departure.

Without going to the same lengths of luxury—I would even say pretentiousness—of some of the Continental buildings, it seems to me that some effort could be made to give to the travellers reaching this country a happier feeling, and some comfort. It must not be forgotten that for many people, especially those who are not accustomed to travelling, it is first impressions that count, and it is certainly bad policy to welcome them in out-of-date draughty buildings, where they feel that they are getting no more consideration than the crates or bales packed close by, and through which they have to dodge to reach their train.

Sir Lionel A. P. Warner.—With reference to Dr. Cunningham's observations on the decline of the relative status of Liverpool as a port for overseas passenger traffic, apart from the emigration phase, the decline in the "luxury" passenger traffic at this port became inevitable because of the necessity for transferring the largest and most attractive ships to southern ports to meet the needs of continental traffic and the competition of foreign liners on that route.

There does not appear to be much hope of the big ships returning to the Liverpool route because there is no reason to foresee any change in traffic conditions and competition from abroad which would justify such a transfer. This is no reflection on Liverpool as a port but a necessary step to meet a changed situation. Long before the keel of the "Queen Mary" was laid the Mersey Docks and Harbour Board had foreseen an increase in the the size of liners on the North Atlantic service, and the Gladstone Dock is sufficiently large to accommodate such a vessel at any time without dredging, either in the wet dock or the graving dock.

The passenger traffic of which Liverpool will always hold its share is the "intermediate" section which caters for the needs of business men.

Mr. R. P. Biddle.—I have read with considerable interest Dr. Brysson Cunningham's lecture and offer a few brief observations on his reference to modern maritime stations in general and to Southampton Docks in particular.

It will, I think, readily be conceded that the subject in question must be considered from the point of view not only of the passenger, but also of the port authority and the shipping company; as far as the latter are concerned it may be said that their interests are largely identical.

In the first place, Dr. Cunningham deprecates the use of transit sheds for the handling of both passengers and cargo. Whilst such sheds in Britain are admittedly not so palatial and architecturally ornate as the purely passenger sheds on the Continent, it must be stated in their defence that they do definitely present a sound commercial proposition. The fact that a ship remains at its first berth obviates the necessity of a second movement with the consequent cost of tugs, etc. Moreover, cargo working can commence immediately and simultaneously with the disembarkation of passengers, and the majority of the crew can, if desired, be paid off shortly after the ship is moored. Labour can also be used more economically, as baggage porters can afterwards be transferred to cargo working.

Turning to the passenger, I would point out that on most of the ships berthing at Southampton railway tickets can be purchased on board. It is also possible to despatch telegrams or make telephone calls without leaving the steamer, as in the case of the majority of the vessels telephone connections from shore to ship are arranged immediately on arrival. A number of the shipping companies do not disembark their passengers until the baggage has been landed and sorted in the shed ready for clearance through the Customs, obviously a most convenient arrangement from the point of view of the comfort of the passengers.

It will be appreciated that all these factors contribute to reduc-

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Passenger Maritime Stations—continued

ing to a minimum the time spent by the passenger in the shed with the result that he can enjoy the comforts of the ship until his baggage is ready to be inspected by the Customs authorities and immediately after the completion of the inspection he can proceed direct to the boat train or other means of conveyance.

I cannot help feeling that Dr. Cunningham has allowed the "ideal" to overshadow the "commercial" aspect of the problem of maritime passenger stations, whereas at the majority of ports in this country it has to be recognised that unless the undertaking were commercially sound the question of structural design would hardly arise.

A. L. Gibson (Continental Traffic Manager, L.N.E. Railway).—Dr. Brysson Cunningham's most interesting lecture deals mainly with the maritime stations at which are handled the passengers and cargo to and from some of the world's largest liners, New York, Southampton, London, Liverpool, Genoa, Naples, Bordeaux, Cherbourg, Le Havre and Hamburg are all termini of trans-oceanic services and the design of their maritime stations has been dictated to a very great extent by the size of the vessels using the ports and the nature of the traffic to be handled. The conclusions drawn by the lecturer from his exhaustive survey of conditions and equipment at these ports naturally represent desiderata applicable to stations that are intended to give access to and from ocean-going vessels.

That Dr. Cunningham limited in this way the scope of his lecture was doubtlessly due to exigencies of time, but it is interesting to note from the figures he quoted that while in 1935 rather less than half a million passengers entered or left the principal passenger ports of the United Kingdom in transit from or to places outside Europe, more than two and a half million passengers entered or left in transit from or to the European continent. From the point of view of volume of traffic, therefore, it may perhaps fairly be claimed that the maritime stations serving the regular packet services deserve something more than a passing mention. Although they are necessarily on a smaller scale than those serving the great lines, the problems to be met with are similar and questions of design and amenities must be studied with equal care. The essence of the packet service is speed with comfort and the introduction of fast vessels must be accompanied by the designing of terminal stations that will enable passengers to pass through all the different operations as quickly and as comfortably as possible.

As Dr. Cunningham observes, the London and North Eastern Railway's Parkeston Quay at Harwich was extended recently by the addition of 1,120-ft. of quay, representing three berths suitable for the type of vessel used in the short sea trades. The quay itself has all the necessary crane equipment and rail tracks for the prompt handling of traffic, and on it there is a transit shed, 900-ft. long, 63-ft. wide and 45-ft. high. The shed has two floors, of which the upper one is used only for the handling and Customs examination of goods traffic.

The passenger station known as Parkeston Quay West, is on the lower floor and in the same building as the goods shed, but quite separate from it. On the landward side of the shed is the passenger platform, 920-ft. long, with permanent booking office, money exchange, parcels and enquiry offices, lavatories, and a spacious refreshment room. This station incidentally, was the first in the world to be equipped with the pictorial signs and direction and indicator boards recommended by the International Union of Railways. From the platform passengers arriving by train reach a large hall where are situated the Customs offices, baggage examination space and rooms for the officials engaged in the performance of Home Office immigration formalities. From this hall slopes a ramp to quay level, and passengers cross but a short space of quay to board vessels.

One berth at the extension is at present used for the Harwich-Flushing service, and the other two berths are used as required for the reception of vessels making special calls at Parkeston Quay to embark or land passengers, and for cargo vessels in regular service. The extension offers the most modern accommodation for any regular line for whose vessels a depth of 20-ft. of water at all tidal stages is adequate.

It is interesting to see how far Parkeston Quay West, dealing with short-distance traffic, conforms to the desiderata which Dr. Brysson Cunningham lays down for maritime passenger stations handling traffic to and from ocean-going vessels: (1) Passengers using the station are kept entirely away from the portions of the sheds used for cargo working. (2) With the smaller type of vessel used in cross-Channel work, it would be impracticable to attempt to embark or disembark passengers from the upper floor of a transit shed. Crossing the quay, however, is made as comfortable as possible as the rails and crane tracks are flush with the surface of the quay, and the path from the passenger station to the steamers is kept clear of such obstructions as rolling stock and loading gear. (3) As befits a modern structure, all the usual amenities of a large station are available and are of a high standard. (4) The design of the Customs accommodation and of the space for the performance of immigration formalities—an important factor in cross-Channel work—was carefully considered, so that large numbers of passengers could pass between train and steamer with the least possible delay.

Port of London Authority

Recent Progress

At the meeting of the Board on March 24th, Lord Ritchie, the Chairman, gave an interesting account of the progress of the work of the Authority since his previous review three years ago, when the trade of the port began to recover from the depression of the earlier period.

Shipping.

The total nett registered tonnage of vessels that arrived at and departed from the whole of the Port of London with cargoes and in ballast from and to British possessions and foreign countries and coastwise was as follows:—

Year ended 31st December	Tons
1933	56,480,004
1936	62,168,833

The tonnage for 1936 represents an increase of 5,688,829 tons, or 10.1 per cent., compared with that of 1933, and is a record.

The tonnage for 1933 was 16.9 per cent. of the total for the United Kingdom, while that for 1936 was 17.1 per cent.

The nett registered tonnage of vessels that entered and left the Authority's wet docks was as under:—

Year ended 31st March	Tons
1933	29,381,786
1936	32,219,700

The tonnage for 1936 shows an increase of 9.7 per cent. compared with that of 1933.

The gross registered tonnage of ships that used the Authority's dry docks was:—

Year ended 31st March	Tons
1933	3,279,618
1936	3,104,195

The last mentioned figure is a decrease of 5.3 per cent. on that of 1933.

Goods.

The tonnage of goods imported into and exported from the Port of London, from and to British possessions and foreign countries and coastwise (including transshipment) was:—

Year ended 31st March	Tons
1933	34,321,862
1936	40,888,825

The under noted tonnage of import and export goods was handled by the Authority over their quays:—

Year ended 31st March	Tons
1933	2,497,479
1936	2,841,284

Passenger Traffic.

The number of vessels that used the Tilbury landing stage during the twelve months ended 30th September last was the highest recorded for any year since the opening of the stage on the 16th May, 1930, the number of vessels being 689, representing a total nett registered tonnage of 3,830,163, with a total of passengers embarking and disembarking of 133,082. These numbers have risen from 338 vessels with a nett registered tonnage of 1,760,983 and 56,192 passengers, which were the figures recorded for the first full year's working at the Stage at the 31st December, 1931.

New Works and Improvements.

Lord Ritchie went on to describe the programme of new works and improvements about to be undertaken at the port, which will involve an expenditure of about £12,000,000 and in connection with which, it is proposed to promote a Bill in Parliament during the current year to obtain the necessary powers.

This will form the subject of a later and more detailed notice.

Glasgow and Aberdeen Port Labour Inquiry

(*continued from page 122*)

At the resumption at Glasgow on March 3rd of the sittings of the Board of Inquiry appointed by the Minister of Labour to investigate the conditions of docking labour at the Ports of Glasgow and Aberdeen, and the difficulties of establishing a system of registration, Mr. D. T. John, secretary of the Standing Advisory Committee, Port Transport Industry, said that all the evidence which had been led pointed definitely to the need for some kind of reorganisation that would make possible a better state of affairs at the port. In his opinion, the kind of reorganisation wanted was a register of dockers, jointly controlled by the employers and men.

He contended that it would be possible from a registration scheme to obtain a greater knowledge of the amount of employment obtained at the port and to ascertain who were genuine dock workers. Evidence had revealed a number of abuses of the Unemployment Fund by the use of fictitious names.

Mr. J. C. MacLean, secretary of the Scottish Transport and General Workers' Union, said that he would support a registration scheme only when he could see that it would provide greater regularity of employment and increase the economic and social status of the dock workers. All that the docker had at the present time was a minimum of four hours' work, and a registration scheme would not give him more.

Mr. James S. Spencer, chairman of the Glasgow Shipowners' and Dock Labour Employers' Organisation, summing up the case for the employers, supported Mr. John's plea for a joint registration scheme.

He did not think, however, that the employers would agree to reducing the number of calling-on places and effecting greater co-ordination between them unless there was also a registration scheme in operation.

Sheriff Irvine—Do you say that seriously? Surely such a step as reducing the number of employment centres at the docks from 50 to about 12 would materially improve the situation?

Mr. Spencer—The benefit derived from measures such as the reduction of calling-on stances and linking them, as suggested, by telephone would be inconsiderable without a joint registration scheme.

After the members of the Commission had questioned Mr. Spencer at some length on this point, the chairman intimated that he and his colleagues had decided to have private and separate discussions with the employers and the men.

When the public sitting of the inquiry was resumed late in the afternoon Sheriff Irvine intimated that certain suggestions had been put before the representatives of the employers' organisation and the union towards reaching an agreement.

Sittings at Aberdeen.

Subsequently the venue of the Inquiry was transferred to Aberdeen, with the same board consisting of Mr. J. M. Irvine, K.C., Sheriff of Renfrew and Bute, chairman, Sir James Leishman and Professor T. M. Taylor (Aberdeen). Sittings were held on March 9th and 10th.

During the discussions and the evidence, it was found that the total number of dockers in the union was 519, and that the effective membership was 510.

Witnesses agreed that the union was large enough to cope with normal business at the port, while all the employers who gave information stated that they invariably took on union men first, and only took non-union men when union men were not available.

It was stated that a scheme incorporating registration of workers had been drawn up in 1933, but the union had refused to adopt it.

Mr. E. J. Savage, of the Aberdeen Steam Navigation Company, president of the Port of Aberdeen Labour Employers' Association, stated that while dock labour was nominally casual his firm had a considerable number of men whom the firm regarded as its own men.

It was revealed in a cross-examination by Mr. J. P. Thom, district secretary of the Transport and General Workers' Union, that the men were taken on at the ships' sides. Mr. Thom said he objected to that method of booking, and had suggested central stances where the men could congregate and where the employers could take them on.

In answer to Mr. John, Mr. Savage agreed that there was no need for co-ordination between the calling-on places in the port.

"At the present time the union is perfectly aware that there are not sufficient union men available, otherwise so many non-union men would not be employed," said Mr. Savage in answer to the chairman.

He was not prepared to leave the selection of the additional men to the union. Surely the employeds were entitled to get the type of men they wanted.

The chairman said it ceased to be a joint scheme when the employers claimed the ultimate voice, namely selection of men. One foreman stevedore stated that the men on piece-work earned about 125 per cent. more than the men on time-work. He quoted the case of a man who earned £1 7s. 10d. for 10½ hrs.

Mr. Thom pointed out that over a period of 83 days there were 76 days on which the total number of men employed (union and non-union) were less than the number of union men available.

Mr. Savage said they did not want the union to be overstocked with men but they wanted sufficient men to meet the requirements of the port. Later in his evidence, he said that the Aberdeen dockers were much more satisfactory than those of London as his firm had ships going into both ports. He had always contended that they were very well off in Aberdeen for dockers.

The Chairman—You have no superannuation scheme?

Mr. Savage said it would be very difficult to work out. He did not want to be unreasonable but they must keep in view that these men got very good wages. They were surely entitled to get a fair return for the money they were paying out.

The details of the coaling side of the work of the docks were described by Mr. Alexander Riddell, manager and director of the Aberdeen Coal and Shipping Company, Ltd., who said that for ten years he had been chairman of the joint negotiating committee of the employers and the union.

The Chairman suggested they would be doing a great service if they worked a little scheme between themselves, with a little give and take, embodying a central stance or stances, and a joint committee.

Stevedores who gave evidence agreed that a central stance for engaging men would be a great advantage.

Mr. Robert Pirie, foreman stevedore, revealed that sometimes when another ship came in, a docker already working would leave to go to that ship and employ a man to take his place on the first ship. None of the men were paid by the employer, because the first one had left during the shift and the one that replaced him was not employed by the stevedore.

Mr. R. A. Fairley, of Coast Lines, Ltd., after giving his evidence on the lines of the other employers, referred to the proposed registration scheme for dock workers and said that the employers' association, while they did not claim to have the ultimate voice, wished to have some say in regard to the men who were to go on the list. They did not claim the right of veto, but they wished to have the right to make representations on the matter.

After the chairman had outlined to Mr. Fairley a scheme which included a central booking stance, a register, a joint negotiating committee, regular engagement books and co-operation with the Ministry of Labour, Professor Taylor said he did not think any scheme would be satisfactory which did not make provision for the due safeguard of those employees, who, although not members of the union, had been bona fide dock employees for many years.

Mr. D. Hillman, national docks organiser of the Transport and General Workers' Union, pointed out that the policy of his organisation was a policy for registration. The employers in Aberdeen had accepted the scheme, but the trouble was that the men had refused to accept it. He had visited the docks in every part of the British Isles and the Aberdeen local union was the only one in the union he represented which had turned the scheme down.

Mr. Hillman added that the decision of a mass meeting of men was against registration in its entirety.

The Chairman remarked that the union had no suggestions to make on the matter. The suggestion of the board was that they place before the union a written statement of the proposals dealing with a central stance, provisions for addition to the register, the figures of unemployment, and the employment record.

Mr. Thom thought the union would be prepared at least to give the proposals some consideration.

The Chairman said he had a knowledge of the working population of the North-East for many years and had great confidence in their judgment and their sense of rectitude and fairness, and he was not without hope that "when those proposals are put before them in the form of a ballot in regard to which the procedure would give time for consideration and deliberation, they might in the final issue decide to accept something on the lines of these proposals."

The beneficial working of the registration schemes at Dundee and Leith was described by witnesses. The schemes had increased the regularity of employment at those ports.

At the conclusion of the sittings at Aberdeen the Board returned to Glasgow.

*Harbour Accommodation for Airships**

By A. G. VOROBIEFF (Professor of Airshipbuilding in the Leningrad A.-S. Boobnoff University)

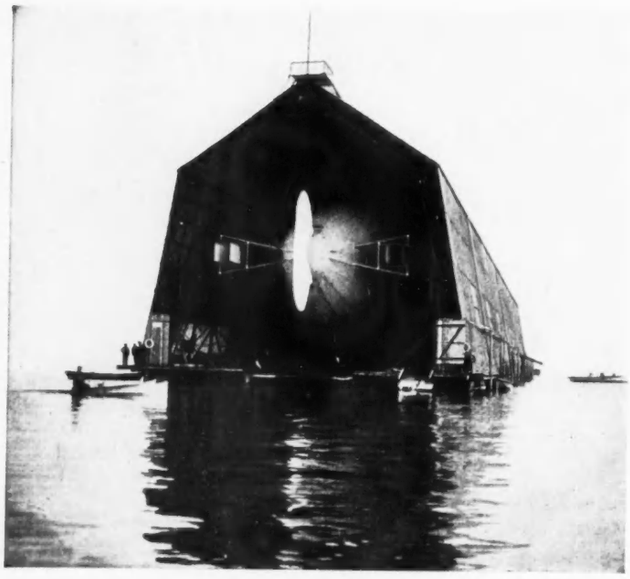

Fig. 1. Airship "LZ 1" in the Floating Shed on Lake Constance.

1. Introduction: Formulation of the Problem.

TO discuss before the members of a Navigation Congress the importance for navigation of having for instance, properly equipped harbours, would be a useless waste of time. Therefore reverting at once to our subject, we must conclude by analogy that in the future the existence or absence of areas, affording facilities for starting and landing of airships, will in a great measure determine, first the appearing or non-appearing of airships, and, next, a speedy or slow development of aerial communication by airships. It is for this reason that the author of the present article, himself a specialist on airship construction, begs to draw to-day the attention of the Association to the problem discussed here. This problem is closely related, on one hand, to airship construction, on the other to harbour construction upon water routes. This is rendered necessary by the fact that, although—in the author's opinion—suitably equipped water areas (aquatoria) for airships may be conceived as quite independent from sea or river harbours, for instance, yet such aquatoria will doubtlessly always evince a tendency to become included in the system of some sea or river harbours; as for the equipment and adequate arrangement of these water areas, the problem must be turned over to specialists on sea and river harbour construction.

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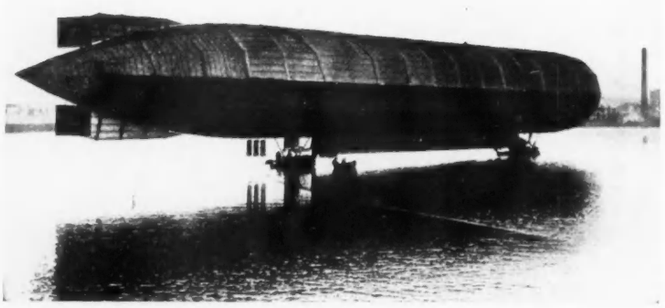


Fig. 2. The First British Airship, "R 1" after leaving Shed.

2. Airship Communication: Development and Prospects.

The first aircraft used for transport by air were airships. In Germany, the Delag Society ran, from 1910 to 1914, seven airships, with a capacity varying from 16,000 m³ to 19,550 m³, which made 1,582 voyages, with a total duration 3,176 hours 5 min. The total distance covered was 182,535 km. at an average speed of 45-58 km./h. and the number of persons carried 34,028 (crews included). Immediately after the end of the war the above-mentioned Society organised aerial communication in Germany, by airship "Bodensee" (capacity 20,000 m³). This ship made in 1919, 103 flights, with a total duration 331 hours 30 min., covering a total distance of 51,258 km. at a higher average speed, 97,5 km./h. and carrying a total number of 4,050 persons (of which 2,380 passengers, balance the crews), 5 tons of postal packages and letters, and 30 tons of passengers' luggage and other kinds of cargo. A protest on the part of the victorious countries put a stop to the flights of the "Bodensee"; however, the Germans had already built another airship, the "Nordstern," with a capacity of 22,500 m³, which had time to make only one voyage, for the above-mentioned reason.

In United States of North America, the Goodyear Co. has run, beginning from July 25th, 1925, and up to the present time a fleet composed of 9 small ships, with capacities varying from 1,500 m³ to 5,000 m³. Up to June 1st, 1932, for instance, this fleet accomplished 32,579 flights with a total duration of 23,430 hours, carrying a total number of 79,224 passengers and covering 1,603,000 km.

In 1928, the "Graf Zeppelin" began her flights of world-wide fame; the capacity of this airship was already 114,000 m³. Up to October 28th, 1933, she had 340 flights on record, with a total duration of 7,500 hours. Forty-nine of these flights were made over the ocean (one over the Pacific Ocean), and one to polar countries. She once flew around the world. In March, 1932, a regular air-line was opened between Friedrichshafen and Rio de Janeiro. Thus we see that aerial communication by means of airships begins to gain gradually a firm footing in the life of mankind.

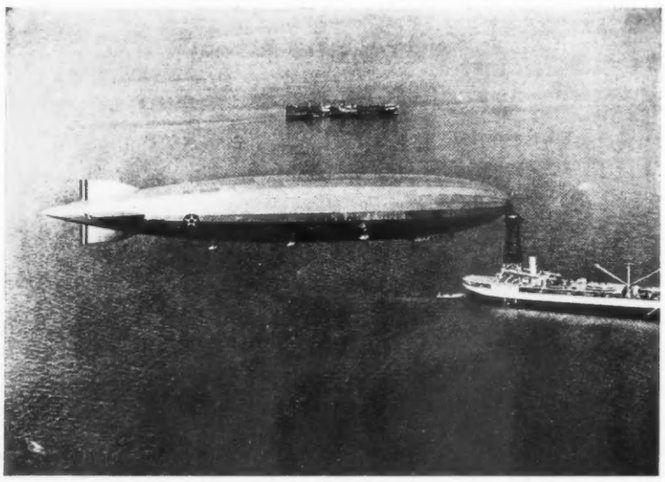


Fig. 3. Airship "Los Angeles" riding at the head of the Mooring Mast on Tank Ship "Patoka."

We are led to expect a continual and still wider use of airships for transport purposes. The Zeppelin Co. is building a new airship, the "Hindenburg," with a capacity of 200,000 m³ and a useful load of 11 tons, a portion of which will be carried in the form of passengers. This airship will fly either over the line, Friedrichshafen-Rio de Janeiro, or over a newly projected line, Europe-America soon to be opened.

The Zeppelin Co. is planning other lines, to be ready within the next few years, i.e., a line Rio de Janeiro-Washington, and a line, Europe-Dutch Indies. The U.S.A. lent in 1932, the co-operation of their firm, "The Goodyear Tyre and Rubber Co.", to the Pacific Zeppelin Transport Corporation and the International Zeppelin Transport Corporation with a

Harbour Accommodation for Airships—continued

view to jointly organising aerial communication by airships over the Pacific Ocean on one hand, and the Atlantic on the other.

A well-known effort was made by England to organise a network of airways on the airships from Canada to New Zealand and South Africa, via the Metropolis. It is true the attempt has not yet been brought to a successful end, as it was suspended by the dreadful catastrophe which overtook in 1930 airship R 101. The latter's sister-ship R 100, which had at the time made one trans-atlantic flight from England to Canada and back, was sold and dismantled.

However, the recently extended airship shed in Cardington still exists, as well as the newly built airship shed in Karachi, and three mooring masts in Montreal, Cardington and Ismailia. With all these conveniences on hand, the organisation of aerial lines for airships either within the precincts of the British Empire, or even on International routes, is a comparatively easy task.

It is the author's firm belief that England will sooner or later decide to renew the above- described attempt.

Fig. 4. Barney's Elliptical Ship.

3. *Advantage of Airships for Oversea Communications.*

Airships are especially suited for aerial communications requiring uninterrupted flights over long distances of several thousand kilometres, over regions where intermediate bases cannot be provided, as, for instance oceans. In overland voyages, airships experience serious competition, not only from airplanes, but even from railroads. For oversea voyages only express packet-boats and passenger steamers can compete with airships. However, the speed of the former is far less than that of airships. Whilst the speed of the quickest steamers is only 50 km. per hour, airships possess a speed of 130 km. It is true that these advantages are somewhat reduced by the fact that atmospheric currents are much stronger than ocean currents, but they still exist. As a result, it takes 3 days to fly from Freidrichshafen to Pernambuco, and 4 days to make the return flight. In 1933, the schedule of flights over the Freidrichshafen-Rio de Janeiro line was drawn up so that the ship which started on a certain day from Freidrichshafen would start five days later from Rio on her return flight to Freidrichshafen. As the Association is better informed than anyone concerning the duration of voyages by sea, it is useless to insist here on the enormous amount of time thus saved. By no other means is it possible to obtain such a saving of time, not even by using aeroplanes. Thus we may well predict a future for airships, in the first instance, on overseas routes. This fact brings to the front with great insistance the problem of organising a connection between transport by sea and transport by airships.

Fig. 5. The Elliptical Ship taking off from the Water.

4. *Relation between Airships and "Water" in the Past and Present.*

From the very beginning, a certain intimacy, if we may use the term, has existed between airships on one hand, and "water" on the other. The first Zeppelin was built in the floating shed on Lake Constance (Fig. 1) and her first flights took place over this lake. Both then and later, when the Zeppelins had been transferred to dry land, they often took off from water surfaces and alighted on these as seaplanes or flying boats do.

The first rigid airship constructed in England, "R1" (fig. 2), was from the beginning required to fulfil certain conditions resulting from the necessity of her eventual intimate relation to the sea. In particular, it was required that the ship should be provided with means for mooring at a mooring mast. The shed for this airship was erected near the shore-line and all the trials she underwent during her brief lifetime were carried on in water. For instance, she once spent three days floating at the above-mentioned mooring mast which had been erected for her.

At the present time, the U.S.A. Navy possesses a special tank ship, the "Patoka" with a mooring tower to which the "Los Angeles" was moored successfully many times (fig. 3). The "Patoka" is being continually sent to various places, from the Bermuda Islands to the Panama Canal, with the object of creating there a temporary floating base.

The "Graf Zeppelin" has been many times subjected to trials, during which she was made to alight on water (fig. 4) and undergo some simple operations of loading and unloading (fig. 5).

5. *Dynamic Flight of Airship and Taking-off of a Statically Overweighted Airship from the Water*

We should, however, expect, in the near future, a new strengthening of the tie between airships and "water," presenting, in one respect, a much greater interest for the Association. One of the actual problems pertaining to the technics of airship construction is that of increasing the useful load of airships, in particular by a proper use of their aerodynamic possibilities. We are accustomed to believe that an

Fig. 6. Airship "Graf Zeppelin" alighting on the Water.

Harbour Accommodation for Airships—continued

airship flies owing to Archimedes' force. However, it is but seldom that airships during their flight are in a condition of statical equilibrium. Generally either weight exceeds statical lift, or vice versa. The difference in either case is equilibrated vertically, in a downward or upward direction, as given by the component of the force of resistance of the air to the movement of the ship. Generally this force is not very considerable. But it is sometimes necessary to create it artifically. In this case it is possible, by giving to the ship flying in a horizontal direction the difference required, to obtain a considerable difference between weight and statical lift. Thus, for instance, the calculations made by the Author in the Research Institute for Mathematics and Mechanics of the Leningrad A. S. Boobnoff University show that the surplus of weight in airship "R 101" (capacity 156,000 m³,, flying horizontally at a height of 500 m. above sea-level, may reach + 13.8 tons and—15.8 tons (at angles of different inclination amounting respectively to + or — 14°). Blakemore considers that for an airship of the "Akron" type we may expect the useful load to increase by 7.5 tons at the expense of the dynamic lift.

We might easily multiply analogous examples. However, those already given are sufficient to show the importance of making a judicious use of the dynamic properties of airships with a view to increasing either their useful load, or their range (when loading the ship with fuel at the expense of the dynamic lift), or else with a view to lessening the size of the ship whilst conserving the same useful load or the same range. The importance of this fact is confirmed by the appearance of designs of special airships where the constructors avail themselves in a great measure of the dynamical lift considered above. We may mention here for example, Burney's design for an elliptical airship (fig. 6 and 7). Owing to its shape, it must possess, as the constructor expects, an unusually great dynamical lift. Fig. 7 shows the taking off of an elliptical airship from the water. However, the practice of aeronautics has on record many takings off of statically overweighted ships from water surfaces. This in not difficult to understand. Taking off from a water surface of an airship overweighted at the expense of aerodynamic lift is the simplest way for the ship of making a start with her supplementary paying load (passengers, mails, freight) or her supplementary fuel load (fuel and lubricants). This leads us to expect in the immediate future the construction of airships provided with the means required for starting from and consequently alighting on water surfaces.

Fig. 7. Trial of the "Graf Zeppelin": Handling the Airship after she has alighted on the Water.

6. Preliminary Considerations concerning the Area, Size and Depth of Water Areas provided for the Starting and Landing of Airships.

As the problem discussed in this article is being proposed for the first time to-day to the Association, and as it is a new one from the standpoint of the technics of harbour construction, it may be yet too early to work out its details. However, it seems opportune, and might even prove useful, if the author, in his capacity of specialist on airship construction, gave here a rudimentary conception of the conditions which aquatoria will be required to fulfil. The author wishes to state that these conceptions have been in a great measure formed under the influence of his conversations with Prof. V. E. Timonoff, Hon. Mem. of our Association; Prof. Timonoff also kindly undertook to read the present paper and gave the author some valuable advice concerning same.

We should conceive two distinct types of aquatoria in the future, possessing essentially different properties. The first type must afford facilities only for the taking off statically overweighted airships. In aquatoria of this type no landings on the water surface after flights, no floating of airships, no loading of ships by using Archimèdes force and no unloading on the same principle, are supposed to take place normally. Only such operations will be made here, as are related to shipment of the paying load, before the start compensated by dynamic lift. As a rule, the airship will not make any stay in the aquatorium where these operations take place. She will put up in an air harbour situated on dry land. Here she will be loaded until statical equilibrium has been reached, after which she will fly over the aquatorium where the balance of the load will be shipped; only then will the ship start on her flight. On her return, the ship will be no longer overweighted, as she will have lost her fuel and lubricants and can therefore land directlly in the air harbour on dry land.

The second type of aquatoria will have no air-harbour. There will be only one joint sea-air (or river-air) harbour, from which the airships will start, where they will land on their return from their flights and where they will stay during loading and unloading (freight and passengers), and also during repairs and taking in of supplies.

These two types of aquatoria will be laid out on essentially different scales, as concerns their area size and equipment. Aquatoria of the first type may and must mainly make provision for a temporary accommodation (of short duration) of moored airships during the arrival and shipping either of paying loads (passengers, passengers' lugguage, mails, other freight), or of supplementary fuel loads, or else of both kinds of load. Moreover, the peculiar construction of airships makes it imperative to have a certain quantity of gas brought up to them.

Aquatoria of the second type should possess more developed mooring accommodation. Facilities for forwarding, loading and unloading (of both paying and fuel loads), and supplying the ships with gas, should also be amply provided.

We conceive aquatoria of the first type as having some simple anchorage accommodation, or, at least, some kind of mooring pedestal or floating mooring mast of very small height (this mast itself must ride at anchor). It is quite unnecessary for aquatoria of this type to have mooring masts like that on the "Pateka," or floating shed. With aquatoria of the second type it is quite different. These the author conceives as offering ample and sound accommodation for mooring, for serious repairs and for supplying airships with everything they need.

But as concerns the parts of the water areas (aquatoria) provided for the starting of airships, these should not differ in both the types conceived by the author. These parts should be identical as to area, linear dimensions, depth and distance from the mooring place of the airship. In both aquatoria the airships will probably have to be brought to "the roads" for the start. By the term "roads" the author means either the part of an aquatorium—or perhaps even a separate water area—specially intended for the starting of airships.

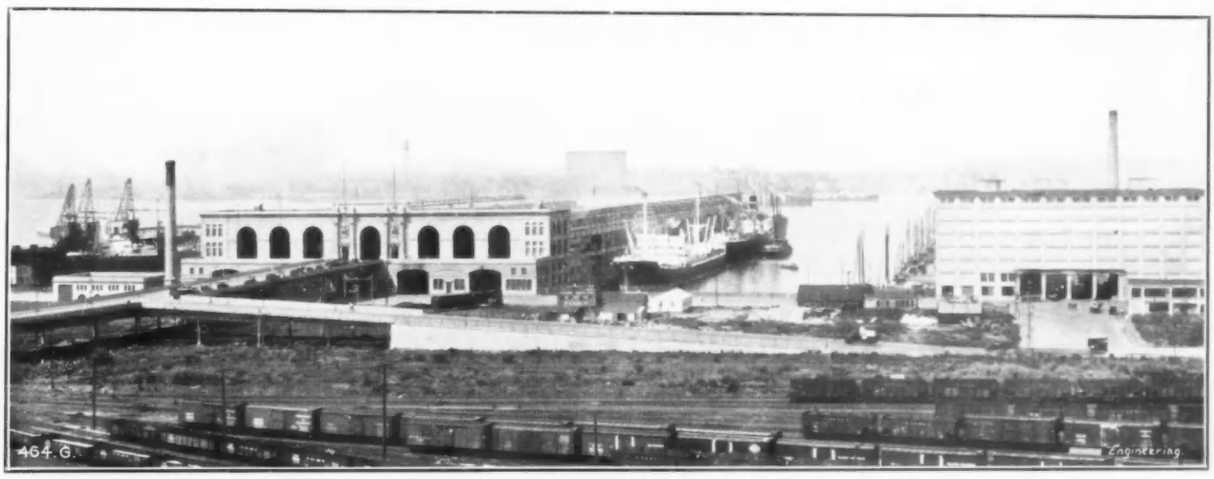
To conclude, let us say a few words about the size of aquatoria. Modern airships have a length of about 250 m. For the design of aquatoria we should take a figure of 300 m. Hence, when the ship is moored it should suffice to have for every ship a circumference with a diameter of 600 m. But the mooring point itself (for example a low floating mooring mast) may displace itself horizontally in any direction. It is therefore necessary to take a somewhat greater diameter, say 750 m., for every one of the airships simultaneously moored, which figure should be sufficient.

Depth is a factor of no great importance; it should, however, be as little as possible, as the draft of airships, even when overloaded, will not in all probability, exceed 1 m. The depth of an aquatorium should probably be determined by the draft of the surface craft used for carrying passengers and freight to and from the airship or hauling the airship from its moorings down to the "roads" (or starting place) and back.

As concerns the size of the "roads" (or starting-place), it is difficult to say anything definite at present. The necessary calculations are being made, but they are not yet finished. At present we can only state that the depth of starting-places in the interests of their working, should not be very great. Most probably the depth of "roads" will be determined by the draft of the surface craft used for conveying the airships between their moorings and the starting-place. It is, however, necessary to state that there should be no essential difference between the starting-places of the two types of aquatoria, either as concerns their area, size or their depth.

Proposed Free Port at Boston, U.S.A.

Abridgment of Report to the Boston Port Authority on the Practicability of Establishing a Free Port at Boston, Massachusetts, by Herr H. Fugl-Meyer, Director of the Free Port of Denmark*



Port of Boston, Commonwealth Pier No. 5. General View from East.

Free Ports and the Service to be derived from them.

MUCH has been written on the subject of Free Ports, and various explanations have been given of their activities. But the writer has noticed that in the minds of the majority of the people with whom he has been in touch there seems to exist an uncertainty, and, in some cases, an entirely wrong idea as to the meaning of the term "Free Port." Many believe that the word "free" means that there are reduced expenses in handling and storing. A short description of the Free Port, and of the services to be expected from it should be helpful, and is therefore included here.

A Free Zone or Free Port is a certain fenced-in and guarded part of a port within which imported goods can be stored without paying customs dues. As soon as these imported goods leave the guarded zone in order to be imported into inland territory, the dues are to be paid in exactly the same way as they are on other imports.

It will thus appear that the advantages offered by a Free Port are practically the same as those offered in a bonded warehouse, and it will be seen that, in countries with a sufficiently effective system of bonded warehouses, Free Ports have been found obsolete.

A Free Port is, according to its idea, suited only for taking care of foreign imports and re-exports.

For countries which import a great quantity of foreign goods, it may be advantageous to have a place where goods can be repacked, graded, cleaned and remarked with a minimum of customs interference. A wholesale merchant who distributes his imported foreign goods to a large number of foreign and domestic customers can, from his own hired storage place in the Free Zone, make up the different parcels to be sent out, have full freedom to dispose of his goods, and have the advantage of avoiding the payment of Customs dues until the goods are sold, thus saving interest and reducing his necessary investments.

Re-exports, which are never to be touched by Customs, will naturally find many advantages in being discharged in a Free zone.

It will be understood that a Free Port, which is a natural competitor of all bonded warehouses, must have a practical system of warehousing and must work in close conjunction with local merchants or with the agents of foreign merchants. It is therefore a fundamental necessity to give first-class service to each individual customer. In many cases it has been found expedient to give the Free Zone into the hands of a public utility company, with certain freedom of action, and, under some restrictions, to let this company run its affairs along commercial lines, and make it possible to attract business through advertising and commercial agents.

In the Free Port of Copenhagen all operations relating to the movement of goods are concentrated in the hands of the Free Port Company. All stevedoring, warehouse work, and all railway shunting and crane operation are carried out in the cheapest and quickest way possible, every movement being co-ordinated from one central administration, which, because of its character as a private limited company, is able to meet all reasonable wishes of the customers.

Experience in other Free Ports shows that the low cost of their operation is due chiefly to efficiency of management. Storage, etc., must be paid on goods in a Free Port to exactly the same extent as in an ordinary port. The technical difference between the construction of a Free Port and that of an ordinary Customs Port is the fact that, in a Free Port, provisions must be made for storage in the zone of a large quantity of goods, whereas, in an ordinary port the transit sheds need not be larger than is necessary to receive the arriving goods and to contain them for a few days.

A Free Port presumes the existence of a number of importing merchants who are willing to use it as a point of distribution to foreign and domestic ports.

Free Ports in Europe and in America.

It often seems as if the trade of Hamburg and Copenhagen were used as a criterion to show the necessity of having Free Ports in the United States. A glance at Fig. 1, which shows the relative sailings at Hamburg, Antwerp and London (Hamburg being the only one of these which has a Free Port), will make it clear that a port can very well develop its foreign trade favourably without having a Free Port. In Hamburg and in Antwerp the physical and geographical conditions are similar.

The idea of creating trade by establishing a Free Port has been used often in Europe. As a general rule, it can be deduced that (1) enterprising local merchants, backed by a local market, are the main factors in creating transit trade; (2) a free zone in a port with insignificant transit trade presents only a complication, and will be avoided by the general traffic if possible; thus it will not act as an inducement towards using the port as a transshipment centre, but will, if built into the other parts of the port, constitute a difficulty for traffic and a bad investment.

A Free Port requires many and varied conditions in order to succeed. Hamburg and Copenhagen are situated at the two entrances to the Baltic, and within a short distance are the

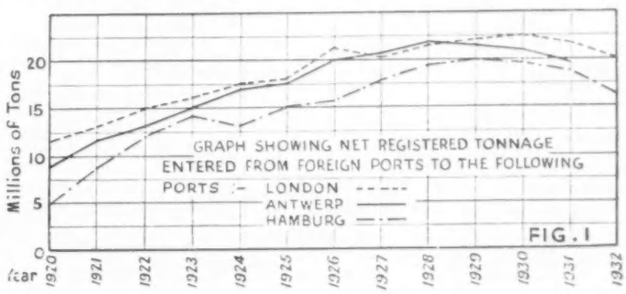


FIG. 1

*Reproduced by permission.

Proposed Free Port at Boston, U.S.A. — *continued*

following countries: Great Britain, Norway, Sweden, Denmark or Germany, Finland, Russia, Estonia, Latvia, Lithuania, Poland, Danzig, Belgium and France. Hamburg, in addition, is connected directly with an intricate maze of canals and waterways which tie it up with all the provinces of Germany, Czechoslovakia, Austria, etc.

Furthermore, Hamburg and Copenhagen are the seat of a business community which for a number of centuries has conducted transit business and has created a local market which, in itself, requires goods to be stored up, awaiting the orders of the local merchants, who have their travelling agents in all the countries mentioned.

It has therefore not been the principal object of these two Free Ports to attract goods or to create commerce, but simply to offer special conditions for the existing traffic. Free Ports, such as Flensburg and Malmo, established to create and attract trade which historically and naturally would follow other channels, have not lived up to expectations, in spite of the fact that Malmo, for instance, is located only a few miles from Copenhagen, and is connected with a large hinterland.

A large part of the United States, and particularly the coast of New England, lies close to only one country, Canada, which recently has closed itself to re-export through American ports.

The hope for a future transit trade is therefore more definitely tied up to Latin America, and a certain amount of such trade is going on at present. Freight rates, however, put most of the ports of the United States at a disadvantage in respect to transshipment trade. European and Asiatic lines connect cheaply a large number of large ports in other continents with South America, thus making transshipping from United States ports uneconomical. The freight problem from Atlantic ports can, at times, be very complicated; for example, sulphur, which is shipped from various Atlantic ports, inclusive of Gulf ports, to Santos and Rio, is sent to these places via Hamburg, where it is stored for some time. This roundabout way, including discharging, recharging and storing, is found to be cheaper than the direct sailing from United States ports to the place of destination.

In New York, where great efforts have been made to establish a Free Port on Staten Island, the arguments in favour of it appear to be very weak. Among the many port experts who have expressed views favouring such an establishment is Mr. McKenzie, Commissioner of Docks of New York City, who concludes a long discussion by saying:

"The main advantage I like to point out of a free zone lies in the fact that, if you have a great quantity of material stored in a free port zone, you have a guarantee to any ship line of full return cargoes from that zone."

This seems rather an unstable basis for a "main advantage." First, it depends upon an "if," *i.e.*, it does not actually exist; second, if this "if" became fact, there would apparently be no guarantee at all for return cargoes. Supposing imports to exceed exports by ten times, the warehouses of the Free Zone could quickly be filled, but the incoming ships would have to leave empty, as a Free Port is not a place from which domestic exports ordinarily would be handled.

During the hearings of the committee of Congress prior to the enactment of the Free Port Act, recommendations were offered by Mr. Hedden of the Port of New York Authority and by Mr. McKenzie of New York City. They seem to have come to the conclusion that there were no actual figures and facts on which to base the establishment of a Free Zone, but that, considering the present situation and the low level of the present traffic, it was the duty of the port to try all possible means of promoting trade, and, as that can be done in New York by the use of existing wharves, the experiment could be made at a reasonable expense, and could therefore be recommended.

Boston's desire to be active in this respect was expressed by Mr. Frank S. Davis, at the hearing of the same committee. Mr. Davis strongly recommended the enactment of the Free Port Act, and spoke on this occasion in behalf of the Boston Port Authority, Boston Chamber of Commerce, the Maritime Association of the Boston Chamber of Commerce, the Retail Trade Board, and the Boston Port Development Company. The brief presented to the committee by Mr. Davis is attached to this report as an Appendix. Under point IV of the brief Mr. Davis states:

"The Port of Boston offers many possibilities as to site and type of facilities for the operation of a Free Port.

In South America a number of Free Ports have been operating since September, 1921. I have not been able to obtain statistics showing the commerce in these places, but an indication as to the working of the zones there may be gathered from the fact that Mexico, which for the past twelve years has operated Free Zones in the Ports of Salina Cruz, Puerto Mexico, Rincon Antonio and Guaymas, opened two Free Ports in 1932, and two more in 1934, in the Ports of Payo Obispo and Cozumel.

In order to attract trade to these zones, many different exemptions from official dues are given to customers using the zones. The official information gives the following particulars:

Foreign merchandise can come to these ports at any time, without being subjected to customs inspection, and can be reshipped without customhouse formalities, to be distributed all over the world.

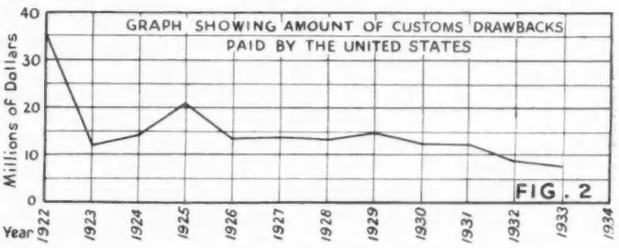
An industry established within these Free Zones will not be subjected to taxes, municipal, Federal or State. The sole obligation imposed on any one desiring to become established in the Free Ports will be the payment of a nominal rental for the place or land occupied.

Under such conditions, the Mexican Nation offers these Free Zones to Europe, the United States and Asia, and any one might avail himself of this offer to establish headquarters for commercial enterprises, and as an additional inducement, at this strategic place of the world, to find new markets for the disposal of their products. . . . [1]

On account of the provisions of the act, Free Zones of this kind would be out of the question for Boston.

The attitude taken in Mexico is the same as that taken in other countries where Free Zones have been established; *i.e.*, during a period when it was found necessary to make an extraordinary effort to preserve or establish trade at a port, such zones are established as an experiment by banks, governments or municipalities directly interested in the welfare of local business life. Endless calculations might be made, but still it would be impossible to prove that a Free Port could create trade which is not in existence at present; yet, in the calculations of the Port of New York Authority, two-thirds of the traffic figured on is new traffic which it is expected will be attracted.

Most of the imported and re-exported articles at the Port of Boston are raw mtaerials, which would hardly ever require any repacking or grading. For such goods the present bonded warehousing stystem is efficient and convenient. It has this advantage over a Free Port, that the bonded goods can be stored at any point to which the steamer happens to bring them, or wherever the owner of the goods wants to have them stored for future use, even in his factory or shop.



The drawback system appears not to have been very effective, judging from the graph shown in Fig. 2, whereas the bonded warehouses appear to form a very important part of the trade of Boston. Table 1 shows the dutiable imports to Boston, and the goods entered and withdrawn from bonded warehouses.

Table 1

Port of Boston	1932	1933	1934
	$	$	$
Total dutiable imports ...	69,998,703	90,349,885	92,325,914
Entering bonded warehouses	8,976,599	18,434,829	13,006,717
Withdrawn from bonded warehouses	7,812,301	12,386,817	12,836,257
Per cent. entered	13	20	14

The last line of the table indicates the percentage of goods which entered bonded warehouses, the percentage being figured on the total dutiable imports. In the Free Port of Copenhagen about 10 per cent of the total imports are permanently stored in the warehouses and sheds. If one arbitarily adds a few per cent for goods which are stored in bonded warehouses in the City of Copenhagen, it can be gleaned from the above figures that the bonded warehouses in Boston answer their purpose.

Where Free Ports have been successful, they generally occupy such a favourable position in relation to other parts of the port in which they are situated that practically all oversea steamers have to call at them. The question of collecting the goods which belong to Free Port business by means of barges and lighters thus becomes of very little importance. A small Free Zone in a large port is only a disadvantage and will add to the cost of transportation. It would be difficult, if not impossible, to select a part of the Port of Boston at which all import goods should arrive, and from which domestic goods, as far as possible, should be excluded. This would result in favouring or harming individual railway companies or landowners; the traffic problem would be doubly difficult, as

[1] "Mexican Free Ports," p. 6.

Proposed Free Port at Boston, U.S.A.—continued

many import goods arrive in Boston in bond on board coastal steamers from New York, and these steamers have their own piers and warehouses in Boston and bring their foreign imports in bond, mixed in with several times as many domestic goods.

From the above arguments it appears that commercially, geographically, and from a traffic point of view, the idea of a Free Zone will meet with some difficulties in Boston. In a later section it will be explained that none of the present piers in the Port is considered suitable for conversion into such a zone.

Although many difficulties may arise, there is a possibility that a Free Zone, run commercially, may some day be needed, when conditions change.

This possibly will be discussed later. At the same time, it will be suggested how a future pier development can be designed so as to lend itself ideally to be used as a Free Port, if business conditions should some day require the establishment of one.

Trade of Boston in relation to Local Harbour Facilities.

In Table 2, figures showing the commerce of Boston during the six years from 1928 through 1933 are given.

Table 2.—Water-borne Commerce of Boston Harbour.

(Short tons of 2,000 pounds)

	1928	1929	1930	1931	1932	1933
Total imports, foreign	2,934,976	3,260,171	2,914,885	2,454,974	1,897,570	1,786,722
Domestic coastwise imports	9,773,538	12,740,794	10,383,050	11,736,388	9,783,438	11,271,776
Total arrivals by water	12,788,514	16,000,965	13,297,935	14,191,362	11,680,008	13,058,498
Foreign re-exports	7,116	3,301	2,979	1,882	3,484	—
Exports of domestic goods	393,078	298,838	254,570	230,069	193,059	164,470
Shipments coastwise	1,938,351	1,710,957	1,225,418	1,552,094	1,036,032	987,102
Total departures by water	2,338,545	2,013,096	1,482,967	1,783,935	1,202,575	1,151,572
Total foreign and domestic imports of general cargo	2,612,000	3,602,738	3,260,238	2,751,887	2,168,338	2,685,895
Coastwise shipments of general cargo	837,733	806,705	674,985	566,519	558,936	451,129

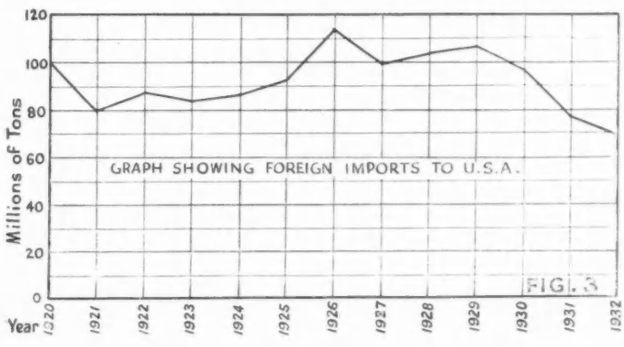
These figures prove that the trade of Boston consists principally of imports of goods for local consumption and of raw material for local factories and for the building industry.

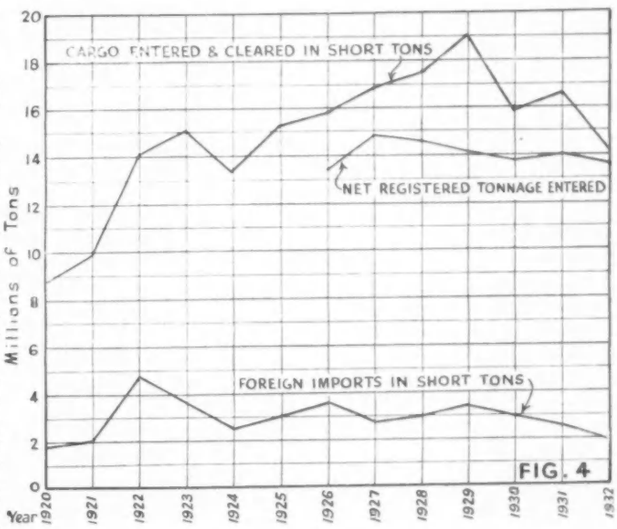
On an average, 19 per cent. of the incoming cargo comes from foreign countries; 81 per cent. is from ports of the United States.

Re-export was so small that, for the five years from 1928 to 1933, it amounted to only 1.3 per cent. of the total exports; to only one-fifth per cent. of the total shipments from Boston; and to only 0.13 per cent. of the total foreign imports. In fact, foreign re-export was so small as to be considered negligible.

The total absence of re-exports indicates that, although Boston is the capital of a well-populated manufacturing State, and is the leading port of New England, it is lacking in wholesale traders of international character. Its importers are, for the most part, directly interested in retail business or manufacturing; they buy and dispose of their goods in order to serve this latter branch of trade, and are, therefore, not interested in developing a local wholesale market with a view to serving the hinterland of Boston and minor neighbouring ports. The wool trade is one of the few international trades important enough to be mentioned, but even this, with the quantities of goods it could bring into a Free Port, is too small to support the Free Port idea; and, if the rule for storing in bonded warehouses is one day changed so as to prevent the United States Customs from marking the bales, the wool merchants, who, to a great extent, are top manufacturers, would lose their main interest in using a Free Port.

The remarkable lack of merchants specialising in an international sphere of action can be explained in different ways. The proximity of New York is not a sufficient reason. From countless examples it can be proved that a smaller city can live and thrive and offer good conditions to its business community even though a large city be close by; but when a city like Boston is unable to offer sufficiently tolerable conditions





share of this inward traffic moves through the gateways along the Hudson River within a distance of one hundred miles from New York City.

I have been informed that rail rates from Boston to central territory, or to the great central part of the United States lying west of the Buffalo-Pittsburgh Line, are higher than the rates to Montreal, Halifax, St. John, Portland, New York (by the differential routes), Philadelphia, Baltimore and Norfolk. On the Eastbound rates from that territory, Boston is on a parity with New York, Portland, St. John and Halifax, while the rates to Montreal, Philadelphia and Baltimore are lower. To and from points located east of the Buffalo-Pittsburgh Line, in the New England States and in New York State, the rates to New York are, in many instances, lower than the rates to Boston. It is contended that there are many terminal services performed free or at a very low cost at New York Harbour that are not available in Boston, which, together with the larger number of steamship sailings at New York Harbour, tend to attract a substantial amount of New England traffic to that port. It is estimated that some two-thirds of New England's export traffic moves via the Port of New York, and approximately 40 to 50 per cent. of the inbound traffic moves via that port.

With respect to the ocean freight rate adjustment up to 1916, it was the practice for the steamship lines serving Boston on export freights to absorb the amount of the differentials enjoyed by Philadelphia, Baltimore and Norfolk. This practice

Proposed Free Port at Boston, U.S.A.—continued

has since been eliminated, and Boston now has the same ocean rates as the other North Atlantic ports.

It is a well-known fact that the Boston Port Authority has been very aggressive in the last few years, taking an active part in the various rate cases, with the view of eliminating these discriminations. Unfortunately, a recent decision of the Supreme Court, to the effect that a port is not a locality, within the meaning of section 3 of the act, has retarded the success of such efforts. There is a hope that the efforts of the Boston Port Authority, if persistently and aggressively carried out, will eventually result in the removal of these discriminations under which Boston is labouring. The more strength and authority vested in this body, the better and more quickly will it be able to solve the problems.

The railway preferences are not, however, the only reasons for the superiority of New York. There is much in the administration and development of the Port itself which would have to be changed before Boston would be able to receive its due share of the shipping to this country; in fact, the physical facilities are becoming old-fashioned.

The total imports of the Port during the period shown in Table 1 reached the figure of 16,000,000 tons, with corresponding arrivals of 14,000,000 net register tons.

The total length of wharf available is:

	Linear feet
Depth at mean low water, 40 to 35 feet	16,600
Depth at mean low water, 34 to 30 feet	9,100
Depth at mean low water, 29 to 25 feet	5,000
Depth at mean low water, 24 to 20 feet	5,500
Depth at mean low water, 19 to 15 feet	9,300
Depth at mean low water, 14 to 10 feet	4,700
Total length of water	50,200

Of this total length of wharf, only 17,000-ft. can be described as forming units of a modern port. The rest are barely able to serve their purpose, and contribute merely to discrediting the Port.

The total of about 19,000,000 short tons handled over a length of 50,000-ft. of wharf gives 340 long tons per linear feet per year. The total for 1933 of about 14,000,000 short tons will give 250 long tons per linear feet.

These figures, if compared with those of other ports of the world, indicate that the wharves, taken as a whole, are effectively used, but that any rush of traffic would overcrowd the present wharves.

This statement is borne out by facts. Captain Miller, former local director of the United States Shipping Board, has, for the months of January, February and March, 1926, counted each day the occupied and the empty berths of some of the better overseas wharves, with the result shown in Table 3.

TABLE 3.

	DAYS	
	Berth Occupied	Berth Idle
Boston and Maine, Hoosac Dock	111	340
Boston and Maine, Hoosac Dock, Grain Berth ...	105	268
Army Base	440	280
New York, New Haven and Hartford Railroad	78	102
Total	734	990

In view of the six days' free storage, all these wharves must be said to be more than effectively utilised in a busy season

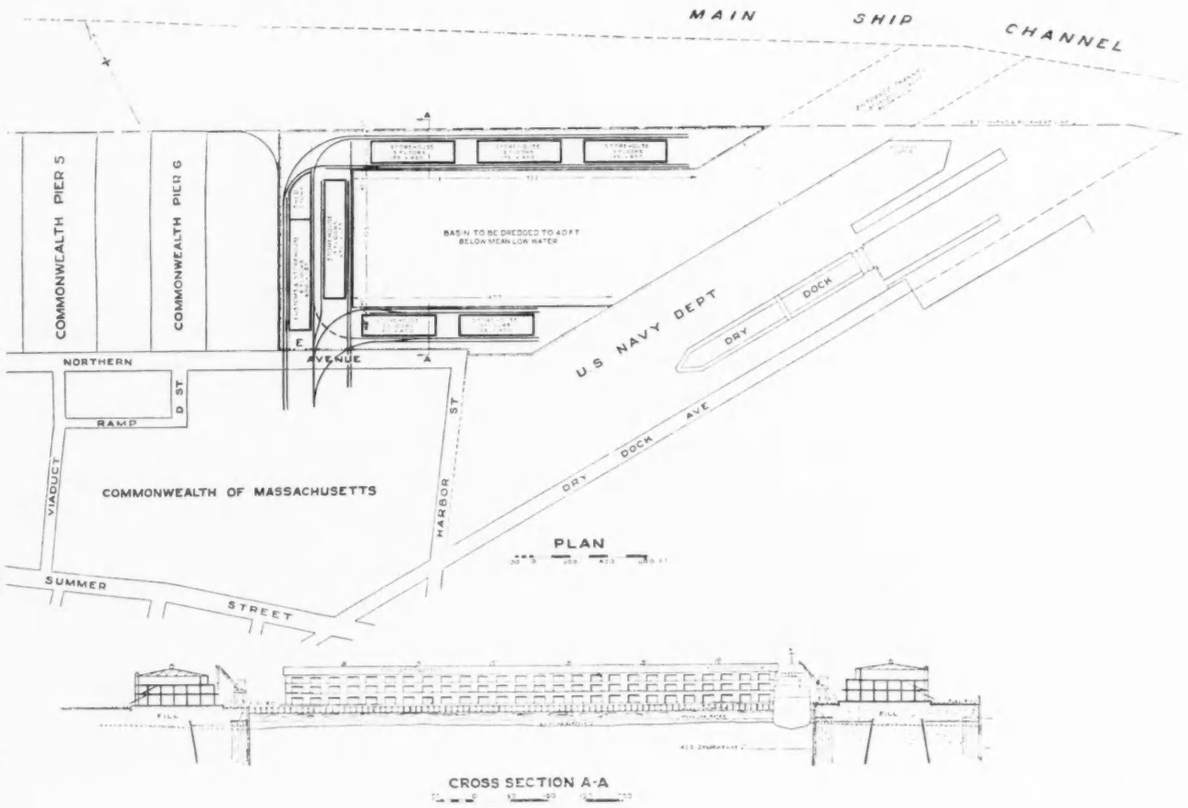


Fig. 5.

such as the one selected for the calculations. It is during the slack periods, however, that preparations should be made for receiving the traffic of better times.

From Table 2 it will be seen that the total arrivals of general cargoes in recent years have not exceeded 3.6 million tons, and about half of this is foreign imports. By adding coastwise exports, there is obtained a total of 4.4 million tons which moved over the piers in 1929, and of only 2.7 in 1932; 4.4 million short tons handled at the general cargo wharves, with a total length of about 18,000-ft., would be about 220 long tons per foot of wharf.

If goods are not to be permanently stored at the piers, this traffic is not too large.

There is, therefore, no immediate need for any wharf extension unless the Port should change its traffic system, and be able to go against the present principles of limited storage at the water front, and build up a port unit with ample storage space at the quay, a unit which at any time could be made into a Free Zone.

It should be stressed that no ambitious building project ought to be entered upon until the major injustices from which the Port is suffering have been rectified. If that is accomplished, there will undoubtedly be an immediate increase in traffic, and the pier described in the following chapter would be strongly needed.

Boston is located nearer to the South American ports than are most of its competing ports, and has a much better ocean access. It has a similar advantage with respect to ocean mileage to northern European ports, as can be seen from the table below (nautical miles):

	Distance to Liverpool	Boston's Advantage
Boston	2,862	—
Montreal	2,972	110
New York	3,056	194
Philadelphia	3,199	337
Baltimore	3,355	493

Proposed Free Port at Boston, U.S.A.—continued

This means that, with the operating expenses necessary to make fourteen runs to or from New York, fifteen runs could be made to or from Boston.

Boston should not alone be able to supply its own hinterland with goods. As soon as all hindrances to its development are removed, it should be able to become for New York what Plymouth and Southampton are for London, as to passenger traffic, and its transshipment activities should be increased many times.

Suggestions for Extension and Possible Future Free Port at Boston.

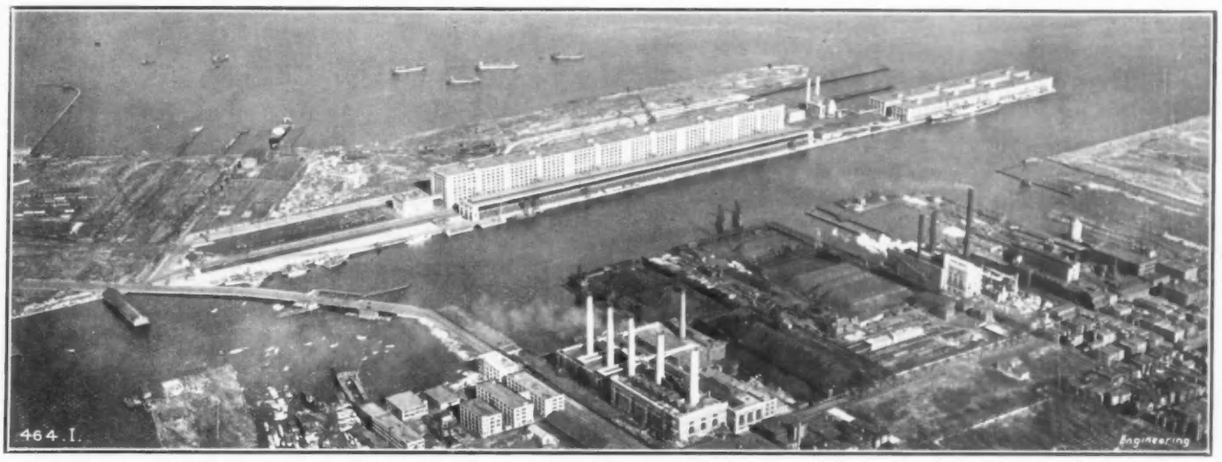
It has already been shown that, although the present traffic does not justify an immediate extension of the docking facilities, such facilities may very soon be required. If built on economical lines, they should almost be able to pay their own way. When it is decided to make an extension, it would be reasonable to build it in such a way that it could be used some day as a Free Zone.

None of the existing piers or wharves in Boston could be used as such. From experience, a pier development is shown to be unfit for Free Port purposes.

where such an extension can be made, and in order to get a basis for an estimate. But, personally, I believe that it would be difficult to find a place with better access and better possibilities for development and extensions, and I also believe that the proposed extension would fit into almost any inclusive development, the same as it would fit in with the rock bottom of the location.

The shape given to the piers makes it convenient to use this extension as an ordinary addition to the Port, and at the same time would be ideal for a Free Port arrangement—one single approach and only entrance from land. (Marked E on the plan).

The strong desire for quay cranes is shown sufficienlty well by the use of the four cranes at the Army Base. I have therefore suggested a warehouse type which requires cranes throughout the length of the new deep-water wharves. It is proposed to build the sheds three stories in height. The cranes will make each of the upper docks just as valuable as the ground floor docks; their width is directed by consideration of cost of transport. A number of cargo elevators and chutes will facilitate the delivery service on the road side of the sheds.



General View of Boston Army Supply Base.

A Free Port must be entirely closed off from the surrounding territory, and should have only a narrow entrance by water and as few gates as possible facing on island territory.

It is probably incorrect, as proposed for the Staten Island Free Zone in the Port of New York, to build a huge fence along the land boundary of the zone, and to leave the water front entirely open to smugglers. It may be said that the water front will be taken care of by the Harbour Police, but why not leave out the fence entirely, and rely on the police force alone? A Free Zone should, if possible, be shaped like a bottle, with only one neck for the passage of the water-borne traffic. This neck should be guarded by a customs guard with quick-running motor boats, so that small boats and barges can be stopped and examined, just as cars are examined at a gate.

Wherever a part of the water front is left open, it will later be found necessary to place a customs guard in each shed and warehouse, and the character of the Free Zone is thereby changed. At the same time, the cost of guarding will be high. The Customs Inspector of Copenhagen Free Port, a man of international experience, considers that the plan proposed for Staten Island would create a stronghold for smugglers.

The location of a port extension for foreign trade should be close to the best ocean wharves of the harbour, and as close as possible to the centre of the business district.

No Free Port will ever be a success if it cannot work in close conjunction with the trading community. The fact that a harbour section is located a few thousand feet from the main body of the Port should, theoretically make no difference, but traffic has its own psychology and laws. A nearby imperfect wharf will be preferred to a distant perfect one, even if the distance between the two is a question of only a few minutes' motor car drive.

The most suitable place for such pier construction, one which could be used as a Free Port whenever desired, and which would have every possible advantage of location, is the shallow water between Fish Pier and the Navy Dock.

In Fig. 5, a fairly detailed layout for such an extension is shown.

This plan is in no way an attempt to prejudice the engineers who, in the future, are to make an inclusive plan of the development of the entire Port. It is drawn up to show how and

The sheds are of such a size that goods landed can remain stored until delivery is made. Storage of such goods will be one of the main sources of income for the new harbour unit, whether the unit is used as a Free Zone or not.

In compliance with modern conditions, the stories are low. High stacking is inconvenient for delivery, is expensive, and, in most cases, impossible, on account of the many small groups of goods.

A six-storied building is contemplated, with office and store space to be rented to private owners of goods, in case that it should be decided to convert the proposed extension into a Free Port; but even an ordinary port unit may wish for such a storage space. The lower story should be used for customs examination and for storing examined goods which are to be carted off from the western platform. All upper stories are for rental.

The proposed renting out of space is a necessary part of the business of a Free Zone, mentioned previously.

The extension could be made in several stages.

Conclusion and Recommendations.

The results of the commercial and physical survey, in which I have made use of all available statistical and other information, can be classified as follows:

1. Commercial.—There is in this port at present no commercial basis for segregating a larger or smaller harbour unit for Free Port purposes. Goods arrive in the Port in such a way that the present bonded warehouse system satisfies the need of the merchants in a more economical way than would a Free Port.

2. Physical.—No part of the present Port is technically fit for conversion into a Free Zone, but a suitable place for a future development can be pointed out.

3. Geographical.—The geographical position of American ports, and especially the position of Boston, seems to discourage the establishment of Free Ports.

4. No Free Port under Present Conditions.—It is evident to everyone that the Port of Boston should be developed to greater perfection, and that the present stagnation cannot cease until a radical change is made. There are many improvements to be made—one of them may one day be the establishment of a

Proposed Free Port at Boston, U.S.A.—continued

Free Zone, but there are other fundamental needs which must be corrected before any thought is given to Free Zones.

In order to give the Port of Boston a possibility to compete favourably with other ports, foreign and domestic, the following recommendations should be made:

5. It is of primary importance that sufficient authority be vested in a local Port administration with financial support, in order to place responsibility where it belongs, and to awaken local interest in the Port, and to give the Port strength to fight its most imminent ills, such as railway differentials, wharfage and dockage rules, control over the maritime zone, freight rates, etc.

6. At the earliest possible date an inclusive and comprehensive study should be made, so as to prepare a plan for the future development of the piers and wharves of the Port as a safeguard against future scattered and short-sighted development.

7. As soon as the major ills of the Port are cured, an extension is warranted. It would be possible to build this extension so that it could be converted into a Free Zone if desired.

Appendix: Brief of Mr. Frank S. Davis

The following is the statement of Mr. Frank S. Davis, representing the Maritime Association of the Boston Chamber of Commerce, at the hearings before a Subcommittee of the Committee on Ways and Means, House of Representatives, March 7, 1934:

I appear here on behalf of the Boston Port Authority, Boston Chamber of Commerce, the Maritime Association of the Boston Chamber of Commerce, the Retail Trade Board, and the Boston Port Development Company, all of whom have authorised me to state that they favour the enactment of enabling legislation that would permit the establishment of a foreign-trade zone or Free Port within the limits of the Port of Boston.

I may also say that several years ago the Massachusetts Legislature passed a resolution authorising the State Department of Public Works to inquire into the feasibility and expediency of the establishment, under Federal authority and in accordance with Federal statutes or regulations, of a Free Port within the Port of Boston, and the means and methods by which such establishment, if found to be feasible, and expedient, may be carried into effect, together with the appropriate methods of meeting such expense as may be involved therein. The conclusions of the Department, briefly stated, were as follows:

1. There is at the present time no authority, public or private, which may establish a Free Port in any port of the United States.

2. Present agencies operated under the customs jurisdiction and tariffs acts may perform certain re-exporting, manipulating and manufacturing under bond, but these are limited and have not the facility of procedure which is provided in a Free Port.

3. Foreign free ports may be listed under various classes, some with restrictions and with varying degrees of success, due to geographical locations and other factors. But the spread of the Free-Port idea and establishment in recent years of Free-Port facilities in numerous ports leads to the conclusion that the Free-Port facility has proven an advantage to the port where established.

4. The Port of Boston offers many possibilities as to site and types of facilities for the operation of a Free Port.

5. The lack of Federal enabling acts for the establishment of Free Ports prevents at the present time the presentation of definite or detailed recommendations regarding the establishment of a Free Port within the Port of Boston. The Department believes that the interest in this subject in various parts of this country will result in presentation before Congress of legislation to provide for the establishment of Free Ports.

The Port of Boston, as members of the committee probably know, is made up of a series of peninsulas which afford natural locations for a foreign-trade zone. On some of these peninsulas, such as South Boston, where at the Boston Army Base, which cost the government about $28,000,000, and at Commonwealth Pier No. 5, combination freight and passenger terminal constructed by the State of Massachusetts at an expense of about $4,000,000, modern water-front facilities are provided. Other locations, such as Jeffrey's Point, where the Boston Airport is located, and the so-called "Cow Pasture" in Dorchester Bay, and the Boston Port Development property in Revere, are not yet provided with pier facilities, but private interests are developing the "Cow Pasture" property and the Boston Port Development Company's project in Revere, and these private interests are much interested in having the Federal government enact the necessary enabling legislation that would permit them to utilise part or all of these properties as a foreign-trade zone.

New England industries depend very largely upon foreign raw materials for their manufactured products. The volume of foreign imports at the Port during the past seven years has averaged well above 2,500,000 tons anually. With respect to foreign exports, however, it is a far different picture. Foreign exports at the Port of Boston have steadily decreased from 1,250,000 tons in 1910 to 209,000 in 1932. Of course, this decrease in foreign exports is due to a number of reasons, such as the unsettled condition of foreign markets, the differentials against Boston in the railroad rates from the interior, and the certain unfair and discriminatory practices that have prevailed at the Port of New York and which were only recently corrected by a formal decision of the Interstate Commerce Commission in what is known as the New York Warehouse Case.

Nevertheless, it all emphasises the unbalanced condition of the foreign commerce flowing through the Port of Boston, the exports in 1932 being only about 10 per cent. of the foreign imports.

Boston is the centre of an intense industrial section of the country. A foreign-trade zone at this port would naturally attract huge supplies of foreign raw materials from which New England industries could draw at will, and, under the provisions of the bill under discussion (H. R. 3657), such foreign imports could be "stored, exhibited, broken up, repacked, assembled, distributed, assorted, refined, graded, cleaned, mixed with foreign or domestic merchandise, or otherwise manipulated," which, it may reasonably be assumed, would result in considerable quantities being so treated and re-exported to foreign countries.

It is this hope, that the establishment of a foreign-trade zone at the Port would contribute to a more balanced situation as between foreign imports and foreign exports, that to a large extent justifies Boston's interest in having the pending enabling legislation enacted.

Moreover, Boston, by reason of being in close proximity to Canada, is in a position to bid for Canadian exports which could be handled through a foreign-trade zone and there manipulated or otherwise treated, as provided in the pending bill, and then re-exported to foreign countries.

All of this would afford relief to the serious local unemployment situation, and at the same time would, of course, provide cargoes for our Merchant Marine and traffic for our railroads which they are not now receiving.

On behalf of the interest I represent, I very respectfully urge the committee to favourably report the bill under discussion.

I call attention to the fact that the bill, as now drawn, would limit the authority to establish and operate a foreign-trade zone to public corporations, specifically described in the bill as "a State, a legal subdivision thereof, or a municipality, or a lawfully authorised public agency of a State or municipality." We should very much like to have the bill amended so as to make it possible for such foreign-trade zones to be established and operated by private interests, subject, of course, to Federal supervision and regulation. I am authorised to state that so far as Boston is concerned, private interests are prepared to do this if and when the necessary enabling legislation is enacted by the Federal Government.

The New Dock Facilities at Southampton.

In the January issue of *The Dock and Harbour Authority*, an illustration was published showing the new sheds at Empress Dock, Southampton, then in course of erection.

We are now able to show a further picture of part of the completed shed.

It will be remembered that these new erections take the place of buildings which were previously destroyed by fire and the new facilities provide more than 5,500 square feet of covered floor space.

A. and J. Main and Co., Ltd., of Vincent House, Westminster, London, S.W.1, and Glasgow, were responsible both for the construction and erection of the new sheds.

Reviews

DETERIORATION OF STRUCTURAL MATERIALS IN SEA WATER.

The appearance, very shortly after its predecessor, of another Interim Report (the sixteenth) by the Committee of the Institution of Civil Engineers on The Deterioration of Structures of timber, metal and concrete exposed to the action of sea water, indicates the activity with which investigations are being prosecuted in this country into a matter of such vital interest to the community as the preservation of dock and harbour works from premature destruction and decay. From time immemorial the ravages of marine organisms have caused widespread concern and the concerted action of scientific enquiries and bodies in many parts of the world in examining the conditions under which such depreciations are made and fostered is not only timely, but imperative for the sake of ensuring the soundness and stability of port installations and relieving the anxiety of those responsible for their maintenance in good repair.

The present report follows the more elaborate fifteenth which reviewed and summarised the work of the committee from its inauguration in 1918 up to the year 1931 and takes up the thread of their investigations. As previously, it deals with measures for the protection of timber, metal and concrete.

As regards timber, experiments have been continued on the use of creosote with the addition of various quantities of D.M. (chlorodihydrophenarsazine) and of carbasole. A series of timber specimens so treated and exposed at Singapore, Wellington and Auckland (N.Z.), are stated to be still showing, in general, a good resistance to "Teredo" attack. Specimens at Plymouth, however, treated with less than 0.3 per cent. of D.M., were found to contain "Teredo" channels. Blocks treated with creosote with the addition of 0.2 per cent. of D.A. (diphengl chlorarsine) showed at Singepore effective resistance, but others, impregnated with fuel oil only, were severely attacked by both "Teredo" and "Limnoria." At Colombo, another series of blocks were creosoted by the Bethell process, with the addition of 5 per cent. of D.M. and 5 per cent. of B.D.C. (a mixture of phenyl arsenious oxide and phenyl arsenious chloride). This series was exposed in 1928 and the surviving specimens removed for examination in May, 1931, after five years exposure. All the blocks containing creosote were free from "Teredo," so that it was not possible to study the effectiveness of the added poison. Attack by Lemanona, on the other hand, was severe and the added poison proved no deterrent. Various other tests have been carried out at Bermuda, Jamaica, the Gold Coast and elsewhere with results of varying character. It is to be noted that Greenheart continues to show good resistance to attack at places so far apart as Auckland (N.Z.), Leith and Southampton. Pynkado has also a good record from Auckland and Colombo. Three native timbers at Iakoradi (kussia, kaku and potrodum) have given promising results after three years' exposure.

The deterioration of steel has been under observation at Auckland, Colombo, Halifax and Plymouth. Submerged specimens at Colombo, unfortunately, became so heavily covered with marine growth as to render examination impossible. In the aerial tests, the rolled irons seem to have suffered most severely. The 3½ per cent. nickel steel suffered as much as the mild steel, but the 36 per cent. nickel steel was in every case in good condition. Cold-blast cast iron at Colombo deteriorated more than hot-blast cast iron.

Of the reinforced concrete tests it is stated that the results, taken as a whole, gave no one cement marked superiority. Resistance increases with richness of mixture and concrete of dry consistency is more resistant than that of normal consistency.

The publication, which has been edited by Mr. A. H. Naylor, Secretary of the Committee and Mr. H. J. Grose, and is published under the auspices of the Department of Scientific and Industrial Research, contains a brief notice of marine piling investigations in the United States of America and a reference to a Paper by Messrs. G. Smith and P. Palen, presented to the International Association of Navigation Congresses, in which a description is given of the methods of preparation and application of coatings containing Portland Cement with an admixture of arsenious oxide, sand and water. The pamphlet is obtainable from H.M. Stationery Office or their agents at the price of sixpence.

GREAT WESTERN DOCKS, 1937.

This publication contains a serviceable store of information respecting the docks of the Great Western Railway, including not only the important coaling ports in South Wales, but others of a more general character in the South and West of England, such as Fishguard, Plymouth, Weymouth and Brentford, all of which serve different purposes. Fishguard is, of course, the G.W.R. port for Ireland, and Weymouth has an extensive traffic to the Channel Islands. Brentford, on the other hand, is used by small vessels carrying cargoes to and from the Continent and by barges. In addition to profusely illustrated descriptions of all these and other docks, great and small, owned or served by the company, this compendium of information contains intelligence concerning such matters as rates and charges, steamship services, warehouses, and other facilities provided for the convenience of the trader. A feature of special interest is a series of what are called "Trade articles"; these occupy some thirty pages, and cover such subjects as the South Wales coal trade, the grain trade, and the general cargo trade of South Wales. The many maps and large folding plans are a valuable feature of the handbook.

LES PORTS MARITIMES FRANCAIS. Second edition. Edited by "Science et Industrie." Pp. 256, with diagrams and illustrations. Price 50 francs. (Paris: rue de Berri, 29).

This is an excellent compendium of information on twenty leading French ports, accompanied by coloured plans, diagrams and photographic illustrations. Each port is described by the Director or Chief Engineer of the port, or by some equally competent authority, and a very full account is given of the physical characteristics, the accommodation and facilities for shipping and the trading activities of the respective centres.

There is a Preface by M. Laurent-Eynac, former Minister of Public Works. He points out that whereas in 1919, the "Ile de France" at that time the giant of the Compagnie General Transatlantique, could only enter Le Havre about the time of high water and could not be sent to Bordeaux by reason of insufficient mooring depth, either in the stream or alongside the quays; at the present day, its successor in magnitude, the "Normandie," can enter Le Havre and the Gironde at practically any hour and remain in complete security within the Tidal Basin of the former or alongside the jetty at Le Verdon. M. P. H. Watier, Director of Navigable Waterways and of Maritime Ports at the Ministry of Public Works, contributes an Introduction in which he calls attention to the fact that, in spite of the natural advantages of the coast line, the majority of French ports, notably Dunkirk, Le Havre, Caen, La Pallice, Saint Louis du Rhone, etc., have been created in the face of very unfavourable geographical conditions. Discussing the distribution of the total expenditure on post-war port works in France, he shows that the greatest part of the expense incurred by the State has been in connection with dredging operations and the improvement of access channels to meet the standard set by modern vessels. An important fraction has gone to the installation of new and enlarged dry or graving docks, while 19 per cent., only, represents the cost of additional quay construction. He considers there is still much to be done in completing the available accommodation, especially for the reception of "flying ships."

M. A. de Maisoncelle, in a succeeding article, explains the system of administration which obtains in France for its commercial ports, and shows how constructional and maintenance works, except in the case of autonomous ports, are undertaken and financed under the direct supervision and control of the State, while as regards equipment, the doctrine prevails that the creation and exploitation of port equipment remains outside the initiative of the State, whose sole function is to grant concessions and authorisations and to control the use which is made of them.

M. A. Dargenton concludes the series of introductory articles with an exposition of the functions and responsibilities of the Lighthouse and Buoyage Service. Altogether, there is provided an excellent account of the various matters connected with port administration in France, which cannot fail to be of service to French port authorities and of interest to their English colleagues. The volume is well printed and tastefully produced.

South African Port Dues.

It is announced that when certain formalities have been completed port dues at all harbours in the Union of South Africa will be reduced by 50 per cent. This reduction is intended to consolidate the great increase in tonnage and shipping which has been handled since the beginning of the Abyssinian war, when Far Eastern and Australian ships were diverted from the Suez Canal to the Cape route. Since the war many ships have continued to use the Cape route, but in view of the heavy commitments on harbour improvements the South African Railways and Harbours Administration wishes to make certain of keeping the extra trade.

Notes of the Month

Hydraulic Power Installation at Bombay.

We are informed that the Bombay Port Trust have placed an order with the Harland Engineering Co., Ltd., of B.E.P. Works, Alloa, Scotland, for pumping plant at Bombay Harbour, comprising five electrically-driven horizontal high-pressure pumps for an hydraulic power installation, and four electrically-driven low-pressure pumps for the return of the exhaust water to a storage tank. The bulk of the plant it to be despatched by the end of May.

The St. Lawrence Waterway.

According to the New York correspondent of the Montreal "Gazette," Mr. A. O. Stanley, the American Chairman of the International Joint Commission (on which Canada and the United States are represented each by three members), stated recently that the Commission is considering new plans to shorten the water route from New York to Montreal by 1,600 miles.

The Commission is now considering the further extension of the proposed St. Lawrence waterway by the deepening of the Richelieu River, the utilisation of the waters of Lake Champlain and the deepening of the existing canal connecting the head waters of Lake Champlain and the Hudson River near Albany, thus shortening the water route from Montreal to New York by approximately 1,000 miles.

Manned Light Vessels.

The Elder Brethren of Trinity House, the Chamber of Shipping and the Liverpool Steam Ship Owners' Association have agreed to set up a committee of representatives of those authorities to consider whether, having regard to the development of wireless and other modern aids to navigation, the reasonable requirements of shipping permit of any reduction in the number of stations in the service of Trinity House which are occupied by manned light vessels; and what should be the types and standard equipment of the vessels employed.

Admiral Sir Percy Douglas has, at the request of the President of the Board of Trade, agreed to act as the chairman of this committee, which is now starting on its enquiry.

Proposed New Elbe Harbour of Refuge.

It is reported that a lying-up harbour is to be constructed at Krautsand, situated opposite Glückstadt, on the Lower Elbe, about mid-way between Hamburg and Cuxhaven. A sum of Rm. 18,000 has been placed at the disposal of the local authority towards the cost of the work which will, it is stated, be commenced this year. According to a press report, the harbour is primarily intended to serve as a refuge station for ships which get into difficulties when ice conditions prevail on the Elbe.

New Grain Silo and Quay Extension at Belfast.

The Belfast Harbour Board have agreed to the terms of a lease with Messrs. R. and H. Hall, Ltd., for a site for the erection of a grain silo, including the provision by the Commissioners for a berth, 460-ft. in length, with a depth of 30-ft. at low water, in continuation of the Eastern Quay of Pollock Dock. The work is to be proceeded with forthwith.

Proposed Yacht Harbour at Southend-on-Sea.

Following the rejection by Southend Council recently of an offer, sponsored by the Royal Corinthian Yacht Club, to provide a harbour at Southend costing £250,000, the Inter-Yacht Club has now submitted to the Council a proposal for a deep-water harbour at Southend pierhead. The cost is estimated at about £50,000.

The proposal is that an area near the pier should be dredged and a breakwater provided. This breakwater would give shelter to the exposed parts north and east of the pier, and would provide safe anchorage to hundreds of yachts and other craft.

In addition, the harbour would enable the lifeboat to be launched more easily from the new lifeboat station.

It is stated that the proposal has been favourably received by the Pier Committee, and the Inter-Yacht Committee were asked to push the matter forward.

Proposed Harbour Works at Gdynia.

The Gdynia Port Authority last year prepared a four-year plan for harbour works, involving a total expenditure of about 67 million zloty. The scheme was at first accepted by the Polish Central Authorities, but the amount was subsequently reduced by one half, and it was feared that still further reductions would be made. Strong protests are being made by those concerned, and it is understood that an extraordinary meeting of the port authority has been called to protest against the original scheme being cut down, and to urge that the four-year plan should be carried through in its entirety. The plan provides for an increase in the number of cranes to enable large quanties of goods to be handled, the provision of additional railway lines, and the deepening of the harbour basins.

Expansion of Fredericia Harbour.

At a meeting of Frederica County Council it was decided to carry out the proposed expansion of the harbour as soon as possible. The total cost of the improvements is estimated at 3,100,000 kroner, and will include the addition of 1,100 metres of quay accommodation and an area of 35,000 square metres to the harbour itself.

French Port Hours of Labour.

The 40-hour week came into force in France, as regards dockers, on February 22nd. The men, as from that date, cannot work more than 6 hours 40 minutes a day. An alternative is offered in the shape of 5 working days, of 8 hours each, in the week. Other arrangements, with a maximum of 8 hours daily, can be taken, subject to the men's agreement. Working by shifts is barred unless on exceptional permission.

Seaham Harbour Dock Extension.

Mr. Malcolm Dillon, presiding at the annual meeting of the Seaham Dock Company at Seaham Harbour, County Durham, recently, said that the directors had in view the installation of a new shipping berth at the South Dock extension, because of increased trade. New gates would be placed in position at the South Dock in June, and the dock would be closed for from three weeks to a month while the work was being done.

Danzig Port Traffic in 1936.

According to statistics of the Danzig Port Authority, 5,398 vessels, with an aggregate of 3,303,030 tons net, entered in during the course of 1936, as compared with 4,454 vessels and 2,842,398 tons net the previous year, which was an increase of 944 vessels and 760,632 tons net.

This increased traffic was due to larger arrivals of bulk cargoes, but, on the other hand, a considerable decrease occurred in the imports of the more valuable classes of commodities, which bring in a good revenue to the port, especially herrings and goods in packages from oversea. The number of national flags represented in Dandig's maritime movement in 1936 was 25, apart from the Danzig flag, exactly the same number as in the previous year.

Canadian Lighthouse Service.

With approximately 50,000 miles of coast line along the Atlantic and Pacific Oceans, the Great Lakes and other lakes within the boundaries of the Dominion, the Canadian Government Department of Marine consequently has to maintain an extensive lighthouse service. This service requires, during the season of navigation 2,000 lights, 400 fog signals, 600 gas and signal buoys, 12 lightships, 32 radio stations, 9,000 unlighted buoys, beacons and day marks, a total of more than 12,000 individual establishments.

One of the best-known lighthouses, to those who go down to the sea in ships, which comes under the administration of the Canadian Government Department of Marine, is the lighthouse at Cape Race, on the Coast of Newfoundland. The flashing light in this lighthouse is over one million candle-power and has been seen a distance of 76 miles. The optical apparatus and lantern weight 42 tons and cost $40,000.

Shipping at Montreal during 1936.

It is reported that the Port of Montreal in 1936 experienced its best season since 1928. Shipments of grain and exports of general cargo reached their highest point since that year. More vessels entered inwards in 1936 than ever before in the history of the port and the number of ocean-going ships was the largest in the past eight years. Inwards from sea, 1,171 vessels docked at Montreal compared with 1,080 in 1935. Outwards for sea, 1,080 compared with 938 for the previous year; outwards coastwise, 1,597 in 1936 as against 1,424 in 1935. The season was marked by a considerable increase in imports and exports as well as an increase in the number of passengers and quantity of baggage handled. The total number of passengers reached the high figure of 40,155 compared with 32,261 in 1935, and the number of pieces of baggage totalled 76,920 compared with 75,748.